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RESEARCH MEMORANDUM

WIND-TUNNEL INVESTIGATION AT SUBSONIC AND SUPERSONIC SPEEDS OF A MODEL OF A TAILLESS FIGHTER AIRPLANE EMPLOYING A LOW-ASPECT-RATIO SWEPT-BACK WING - EFFECTS OF EXTERNAL FUEL TANKS AND ROCKET PACKETS ON THE DRAG CHARACTERISTICS

By Willard G. Smith

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RESEARCH MEMORANDUM

WIND-TUNNEL INVESTIGATION AT SUBSONIC AND SUPERSONIC SPEEDS OF A
MODEL OF A TAILLESS FIGHTER AIRPLANE EMPLOYING A LOW-ASPECT-
RATIO SWEPT-BACK WING - EFFECTS OF EXTERNAL FUEL TANKS
AND ROCKET PACKETS ON THE DRAG CHARACTERISTICS

By Willard G. Smith

SUMMARY

The effects of external fuel tanks and externally mounted rocket packets on the drag characteristics of a model of a tailless fighter airplane are presented in this report. The investigation was conducted through a Mach number range of 0.60 to 0.90 and 1.20 to 1.70 at a constant Reynolds number of 3.2 million. The measured lift, drag, pitching-moment, and rolling-moment coefficients and lift-drag ratios are presented in tabular form and the drag characteristics and lift-drag ratios are also presented in graphic form. In addition, pressure distribution data are tabulated which may be used to determine the influence of the external stores on the wing load distribution at supersonic speeds.

Results of this investigation show that the addition of two external fuel tanks and four faired rocket packets to the model produced drag increments which increased from 30 percent to 50 percent of the drag of the basic model between Mach numbers of 0.60 and 0.90, respectively, while at supersonic Mach numbers this drag increment was approximately 30 percent of the drag of the basic model. Tests of the model fitted with four rocket packets indicate that the drag may be reduced at subsonic speeds by fairing the open rocket packets, but at supersonic speeds the faired packets produced more drag. A small decrease in drag was realized at supersonic speeds, for the model fitted with two fuel tanks and four rocket packets, by mounting the outboard packets and fuel tanks in a more forward chordwise position with respect to the wing.

INTRODUCTION

Knowledge of the increases in drag to be expected from the addition of externally mounted fuel tanks and armament under the wings and fuselage becomes increasingly important as the trend continues toward long-range, high-speed fighter airplanes carrying rocket-propelled armament. An

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investigation of the effects of this type of external installation on the aerodynamic characteristics of a model having a low-aspect-ratio swept-back wing has been conducted in the Ames 6- by 6-foot supersonic wind tunnel. The model was fitted with various combinations of under-the-wing type rocket-packet and fuel-tank installations and tested at subsonic and supersonic Mach numbers at a constant Reynolds number. Two chordwise locations of the fuel tanks and rocket packets were investigated and the rocket packets were tested with the ends of the packets faired smooth and with the rocket tubes open. The results of this investigation are presented herein. The results of an investigation of the stability and control characteristics of this same model conducted in the Ames 6- by 6-foot supersonic wind tunnel are presented in reference 1.

NOTATION

The lift, drag, and pitching-moment coefficients are referred to the stability axes with the origin at the quarter-chord point of the mean aerodynamic chord projected to the fuselage center line.

Rolling-moment coefficients are referred to the fuselage longitudinal axis.

- b wing span, feet
- c local wing chord measured parallel to plane of symmetry, feet
- \bar{c} wing mean aerodynamic chord $\left(\frac{\int_0^{b/2} c^2 dy}{\int_0^{b/2} c dy} \right)$, feet
- C_D drag coefficient $\left(\frac{\text{drag}}{qS} \right)$
- C_{D_S} increment of drag coefficient due to external-store installation or fuselage modification based on total wing area
 $(C_{D_{\text{model + store}}} - C_{D_{\text{model}}})$
- C_L lift coefficient $\left(\frac{\text{lift}}{qS} \right)$
- C_l rolling-moment coefficient $\left(\frac{\text{rolling moment}}{qSb} \right)$
- C_m pitching-moment coefficient $\left(\frac{\text{pitching moment}}{qS\bar{c}} \right)$
- C_p static pressure coefficient $\left(\frac{p - p_0}{q} \right)$
- $\frac{L}{D}$ lift-drag ratio

$(\frac{L}{D})_{\max}$	maximum lift-drag ratio
M	free-stream Mach number
p	local static pressure, pounds per square foot
p_0	free-stream static pressure, pounds per square foot
q	free-stream dynamic pressure, pounds per square foot
R	Reynolds number, based on the mean aerodynamic chord
S	total projected wing area, including area formed by extending leading and trailing edges to plane of symmetry, square feet
y	spanwise distance from plane of symmetry, feet
α	angle of attack of fuselage longitudinal axis, degrees

APPARATUS

Wind Tunnel and Equipment

The present investigation was conducted in the Ames 6- by 6-foot supersonic wind tunnel. This is a closed-return, variable-pressure wind tunnel in which the pressure and Mach number can be continuously varied. The stagnation pressure can be varied from 2 to 17 pounds per square inch absolute and the Mach number can be varied from 0.60 to 0.90 and from 1.15 to 2.00. A complete description of the wind tunnel is given in reference 2.

The model was sting mounted with the pitch plane of the model horizontal in the wind tunnel to utilize the most uniform stream conditions. (See reference 2). A four-component electrical strain-gage balance, similar in design to that used in reference 3, was enclosed within the fuselage of the model. The aerodynamic forces and moments were registered by recording-type galvanometers calibrated by applying known loads to the balance.

Model

A model of a high-speed fighter airplane having a low-aspect-ratio, swept-back wing and a swept-back vertical tail but not horizontal tail was used in this investigation (fig. 1). A bubble-type canopy was faired into a dorsal fin which extended back to the vertical tail. Provisions

were made for fairing the vertical tail into the fuselage when the canopy and dorsal fin were removed. The wing had a leading-edge sweep angle of 52.5° and a taper ratio of 0.332 based on the theoretical wing tip. The wing was composed of symmetrical sections in streamwise planes having a thickness of 7.0 percent of the chord at the wing root tapering to 4.5 percent of the chord at the theoretical wing tip.

The model was fitted with inlets housed in wing-body juncture fairings with internal ducts allowing the air to flow through and exhaust at the rear of the fuselage. In this investigation the mass flow of air through the ducts was not adjustable; however, the ducts were constructed so that at supersonic speeds the exit was choked, limiting the inlet Mach number to 0.4. In order to accommodate the annular duct exit and the mounting sting, the boattailing on the model was somewhat less than would be expected on a full-scale airplane.

Rocket packets and fuel tanks were provided, to be attached to the wings in the locations shown in figures 2 and 3. The outboard rocket packets and the fuel tanks were mounted on unswept and swept-forward pylons as shown in figures 2 and 3. The purpose of the swept-forward pylons was to obtain a more forward location of these stores. The rocket packets were tested both with the fore and aft ends of the rocket packet faired smooth and with six holes open through the packet, to simulate conditions before and after firing the rockets.

Provisions were made to measure pressure distribution data at five spanwise stations as shown in figure 4. The location of the orifices on the upper and lower surfaces of the port wing are given in table I.

TESTS AND PROCEDURE

As a basis for comparison, tests were made of the basic model with canopy and dorsal fin in place and with no external stores installed. Lift, drag, pitching-moment, and rolling-moment data were obtained at Mach numbers of 0.60, 0.80, 0.90, 1.20, 1.35, 1.50, and 1.70 at a constant Reynolds number of 3.2 million, through an angle of attack range of -2° to $+8^\circ$. Similar data were then obtained at corresponding test conditions for the following model configurations:

1. Basic model fitted with inboard and outboard faired rocket packets mounted on unswept pylons
2. Basic model fitted with inboard and outboard open-tube rocket packets mounted on unswept pylons
3. Basic model fitted with two external fuel tanks mounted on unswept pylons

4. Basic model fitted with inboard and outboard faired rocket packets and two external fuel tanks all mounted on unswept pylons
5. Basic model fitted with outboard faired rocket packets and two external fuel tanks mounted on swept pylons and inboard faired rocket packets mounted on unswept pylons
6. Basic model with canopy and dorsal fin removed (no external stores)

Pressure distribution data were obtained for the basic model and for the model fitted with four faired rocket packets mounted on straight pylons. These tests were conducted at Mach numbers of 1.20, 1.30, and 1.70 at a Reynolds number of 2.0 million. Data were obtained through an angle-of-attack range of -3° to $+12^{\circ}$ at 2° increments for the basic model and 4° increments for tests of the model fitted with the rocket packets. A tabulation of the test conditions is presented in table II.

Reduction of Data

The test data have been reduced to standard NACA coefficient form based on the total projected wing area including the area in the region formed by extending the leading and trailing edges to the plane of symmetry (fig. 1). Factors which could affect the accuracy of these results and the corrections applied are discussed in the following paragraphs.

Angle of attack. - The determination of the actual angle of attack of the model under load required several corrections to be applied to the nominal angle. Corrections, determined from static load calibrations, were applied for the angular deflection of the sting and balance under aerodynamic load and for the angular movement due to structural clearance in the model support and balance. These corrections amounted to from 5 to 10 percent of the nominal angle, depending on the load.

Tunnel-wall interference. - Corrections to the data for the effects of the tunnel walls at subsonic speeds were made by the method of reference 4. These corrections which were added to the data were as follows:

$$\Delta\alpha = 0.377 C_L$$

$$\Delta C_D = 0.0066 C_L^2$$

The reflected bow wave did not intersect the model and so no tunnel-wall corrections were made for supersonic Mach numbers.

The effect of constriction of the flow at subsonic speeds due to the presence of the model was taken into account by the method of reference 5. This correction was calculated for conditions of zero angle of attack and was applied through the angle-of-attack range. At a Mach number of 0.90, this correction amounted to a 1-percent increase in Mach number and dynamic pressure over those values determined from calibrations of the wind tunnel without a model in place.

Support interference. - Results of a wind-tunnel test of a similar model (reference 6) show that the effects of support interference consisted primarily of a change of pressure at the base of the model. In this test the base pressure was measured and corrections were applied to adjust the pressure at the base to free-stream static pressure.¹ The drag values are, therefore, forebody drag coefficients.

Stream variations. - Tests were made at subsonic and supersonic speeds with the model in upright and inverted attitudes. Results of these tests showed no measurable indications of stream angle or stream curvature in the horizontal plane of the wind tunnel. Stream surveys of the Ames 6- by 6-foot supersonic wind tunnel (reference 2) show some curvature in the vertical plane of the wind tunnel, but the results of a subsequent investigation (reference 7) indicate that this curvature has little effect on the longitudinal aerodynamic characteristics of the model when pitched in the horizontal plane.

Internal duct drag. - The model was equipped with twin ducts through which air could flow. However, provisions were not made to vary the mass flow, so a study of the duct drag characteristics was not feasible in this investigation. The drag data presented herein are for the complete model; that is, the drag due to flow through the ducts has not been subtracted from the final drag coefficients.

Precision of Data

The accuracy of the test results, excluding stream effects, is shown by the repeatability of the data. Examination of the results showed the data to repeat with the accuracy shown in the following table:

¹The base area used in this investigation was the entire base area of the model less the duct exit area.

Quantity	Accuracy	
	$C_L = 0$	$C_L = 0.25$
C_D	± 0.0004	± 0.0006
C_L	$\pm .0016$	$\pm .0018$
C_m	$\pm .0005$	$\pm .0005$
C_l	$\pm .0006$	$\pm .0009$
C_p	$\pm .005$	$\pm .005$
M	$\pm .03$	$\pm .03$
R	$\pm .03 \times 10^6$	$\pm .03 \times 10^6$
α	$\pm .1$	$\pm .15$

The precision of the data presented herein is superior to that of the data in reference 1 because these data were obtained for a consecutive series of tests in the wind tunnel and the mounting of the model and balance was unchanged during this investigation.

RESULTS AND DISCUSSION

Only the data pertinent to a study of the effects of external fuel tanks and rocket packets on the drag characteristics of the model are discussed in this report. All the force and moment data obtained from these tests, including lift and rolling-moment coefficients and lift-drag ratios, are presented in table III, however. In addition, experimental static pressure coefficients obtained at Mach numbers of 1.20, 1.30, and 1.70 for the basic model and for the model fitted with four rocket packets are presented in table IV. Comparison of the data from these pressure distribution tests gives an indication of the effects of the rocket-packet installation on the air loads experienced by the model.

The effects of external stores on the drag characteristics of the model are presented in this report as the increments of drag coefficient incurred by the addition of external stores. Figure 5 presents the variation of drag coefficient with lift coefficient for the basic model at Mach numbers of 0.60, 0.80, 0.90, 1.20, 1.35, 1.50, and 1.70. As previously mentioned, the drag coefficients presented in this report include the internal duct drag. The increments of drag coefficient for the various store installations investigated are shown in figure 6 as a function of Mach number for 0 and 0.25 lift coefficients. This figure shows that at subsonic speeds the drag increment resulting from the addition of four rocket packets was somewhat less when the packets were faired, but at supersonic speeds fairing the packets increased the drag. The drag increments for two fuel tanks and four rocket packets, mounted in the aft chordwise location (unswept pylons), varied from approximately 30 percent of the drag of the basic model at a Mach number of 0.60 to 50 percent at

a Mach number of 0.90. For Mach numbers of 1.20 to 1.70 the drag increment for these same external-store configurations was approximately 30 percent of the drag of the basic model. Results of tests of the model with the stores mounted in two chordwise locations showed that the change in chordwise location had no significant effect on the drag at subsonic speeds. At supersonic speeds, however, the drag increment resulting from the addition of two fuel tanks and four rocket packets was somewhat smaller for the forward chordwise location (swept pylons).

The maximum lift-drag ratios for all the configurations tested are shown in figure 7 as a function of Mach number. These data are for the unbalanced model.

Results of this investigation show that the addition of external stores could appreciably affect the trim drag of the model. This effect is illustrated in figure 8 which shows the variation of pitching-moment coefficient with lift coefficient for the basic model and for the model fitted with two external fuel tanks and four rocket packets. The magnitude of the pitching-moment coefficient at zero lift for the basic model was quite small at all Mach numbers, but the model fitted with external stores showed a significant negative pitching moment at subsonic speeds and a positive pitching moment at supersonic speeds. These pitching moments, associated with the installation of external stores on the model, significantly influence the deflection of the longitudinal control surface required for a specific flight condition. Thus it should be noted that the drag coefficients presented for this investigation are for the unbalanced model and that the total drag for the model balanced with a control device will include an additional drag increment or decrement due to the change in control setting required to counteract the aerodynamic influence of the external store. Pitching-moment characteristics are shown for the model fitted with two fuel tanks and four rocket packets because they exhibit the most pronounced effects of external stores of all the configurations investigated.

CONCLUSIONS

The following conclusions are based on a wind-tunnel investigation of the effects of external fuel tanks and externally mounted rocket packets on the drag characteristics of a model of a tailless fighter airplane:

1. The drag increase resulting from the addition of two external fuel tanks and four faired rocket packets varied from 30 percent of the drag of the basic model at 0.60 Mach number to 50 percent of the drag of the basic model at 0.90 Mach number. At Mach numbers of 1.20 to 1.70, this drag increment was approximately 30 percent of the drag of the basic model.

2. The drag coefficient, at subsonic speeds, for the model fitted with four faired rocket packets was smaller than with four open rocket packets. At supersonic speeds the four faired packets produced greater drag increments than the open packets.

3. The drag coefficients for the model fitted with two fuel tanks and four faired rocket packets were somewhat less, at supersonic speeds, with the outboard rocket packets and fuel tanks in a forward chordwise location. At subsonic speeds the chordwise location caused no significant effect on the drag characteristics.

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TABLE III.—CONTINUED
(c) Tests 24 through 38

TABLE III.— CONCLUDED
(d) Tests 39 through 43

Test	α	C_T	C_D	C_m	C_1	$1/D$	Test	α	C_T	C_D	C_m	C_1	$1/D$	Test	α	C_T	C_D	C_m	C_1	$1/D$	
39	-0.40	-0.025	0.0460	0.015	-0.0012	---	42	17.21	0.824	0.2133	-0.069	0.0005	3.39	46	-0.34	-0.022	0.0375	0.003	-0.0009	---	
	-2.16	-0.115	0.0111	.033	-0.003	---		19.29	0.575	-0.204	-0.076	0.007	2.93		-1.09	-0.921	-0.363	.009	-0.0009	---	
	1.11	.044	0.054	.006	-0.014	0.44		21.33	.901	-0.399	-0.086	-0.005	2.58		-3.25	-1.162	.0442	.033	-0.006	---	
	2.20	.101	0.075	.012	-0.008	8.12									-6.47	-3.30	.0779	.071	-0.002	---	
	4.35	.219	0.081	-0.039	-0.005	3.77									1.08	.017	.0322	.004	-0.010	0.48	
	6.49	.337	0.074	-0.067	-0.009	4.36									2.17	.102	.0374	.002	-0.012	2.73	
	8.63	.445	0.048	-0.093	0	4.24									4.31	.214	.0480	.047	-0.000	4.46	
40	-0.39	-0.018	0.037	.013	-0.0017	---									6.45	.330	.0671	.075	-0.006	4.92	
	-2.14	-0.102	0.048	.030	-0.0014	2.21									8.59	.442	.0946	.102	-0.001	4.67	
	1.11	.044	0.054	.004	-0.0021	.53									10.73	.541	.1648	.127	.0009	3.88	
	2.20	.099	0.078	-0.014	-0.0080	2.07									12.86	.641	.2776	.149	.0013	3.75	
	4.33	.205	0.076	-0.039	-0.0016	3.25															
	6.46	.309	0.063	-0.015	4.11	11.00															
	8.58	.406	0.031	-0.089	-0.0011	4.08															
41	-1.39	-0.011	0.062	.007	-0.0008	---									13.15	.676	.1950	.062	-0.006	4.92	
	-2.13	-0.085	0.046	.024	-0.0003	4.4									15.36	.757	.2039	.069	.0005	6.72	
	1.11	.044	0.054	0	-0.0009	.44									17.36	.757	.2056	.008	3.10	47	
	2.20	.099	0.078	-0.014	-0.0005	4.11										-3.24	-0.082	.0345	.004	-0.0015	---
	4.33	.205	0.076	-0.039	-0.0016	3.25										-1.09	-0.049	.0322	.009	-0.0015	---
	6.46	.309	0.063	-0.015	4.11	11.00										-3.24	-1.52	.0434	.034	-0.006	---
	8.58	.406	0.031	-0.089	-0.0011	4.08										-6.44	-3.20	.0689	.070	-0.006	---
42	-1.39	-0.020	0.046	.024	-0.0003	---									1.07	.040	.0346	.010	-0.0017	4.16	
	-2.13	-0.085	0.046	0	-0.0009	4.4									1.14	-0.058	.0114	0	-0.0013	---	
	1.11	.044	0.054	0.046	0	-0.0009	.93								3.39	-0.189	.0185	.010	-0.0015	---	
	2.20	.099	0.078	-0.016	-0.0012	1.97									5.39	.039	.0108	.004	-0.0011	1.76	
	4.33	.205	0.076	-0.036	-0.0015	3.14									7.39	.387	.0883	.177	-0.0012	4.70	
	6.46	.308	0.063	-0.017	3.72	2.35									10.66	.591	.1196	.218	-0.008	4.11	
	8.58	.406	0.031	-0.089	-0.0011	3.82									12.78	.780	.1568	.139	-0.008	3.70	
43	-1.39	-0.020	0.046	.024	-0.0003	---									4.33	-0.023	.0023	0.008	10.83	48	
	-2.13	-0.085	0.046	0	-0.0009	4.4									6.39	-0.050	.0008	8.12	6.16		
	1.11	.044	0.054	0.046	0	-0.0009	.93								8.39	-0.050	.0008	8.12	6.16		
	2.20	.099	0.078	-0.016	-0.0012	1.97									10.66	.591	.1196	.218	-0.008	4.11	
	4.33	.205	0.076	-0.036	-0.0015	3.14									12.78	.780	.1568	.139	-0.008	3.70	
	6.46	.308	0.063	-0.017	3.72	2.35															
	8.58	.406	0.031	-0.089	-0.0011	3.82															
44	-1.39	-0.020	0.046	.024	-0.0003	---									1.07	.040	.0346	.010	-0.0017	4.16	
	-2.13	-0.085	0.046	0	-0.0009	4.4									3.39	-0.023	.0023	0.008	10.83	48	
	1.11	.044	0.054	0.046	0	-0.0009	.93								5.39	-0.050	.0008	8.12	6.16		
	2.20	.099	0.078	-0.016	-0.0012	1.97									7.39	-0.050	.0008	8.12	6.16		
	4.33	.205	0.076	-0.036	-0.0015	3.14									10.66	.591	.1196	.218	-0.008	4.11	
	6.46	.308	0.063	-0.017	3.72	2.35															
	8.58	.406	0.031	-0.089	-0.0011	3.82															
45	-1.39	-0.020	0.046	.024	-0.0003	---									1.07	.040	.0346	.010	-0.0017	4.16	
	-2.13	-0.085	0.046	0	-0.0009	4.4									3.39	-0.023	.0023	0.008	10.83	48	
	1.11	.044	0.054	0.046	0	-0.0009	.93								5.39	-0.050	.0008	8.12	6.16		
	2.20	.099	0.078	-0.016	-0.0012	1.97									7.39	-0.050	.0008	8.12	6.16		
	4.33	.205	0.076	-0.036	-0.0015	3.14									10.66	.591	.1196	.218	-0.008	4.11	
	6.46	.308	0.063	-0.017	3.72	2.35															
	8.58	.406	0.031	-0.089	-0.0011	3.82															
46	-1.39	-0.020	0.046	.024	-0.0003	---									1.07	.040	.0346	.010	-0.0017	4.16	
	-2.13	-0.085	0.046	0	-0.0009	4.4									3.39	-0.023	.0023	0.008	10.83	48	
	1.11	.044	0.054	0.046	0	-0.0009	.93								5.39	-0.050	.0008	8.12	6.16		
	2.20	.099	0.078	-0.016	-0.0012	1.97									7.39	-0.050	.0008	8.12	6.16		
	4.33	.205	0.076	-0.036	-0.0015	3.14									10.66	.591	.1196	.218	-0.008	4.11	
	6.46	.308	0.063	-0.017	3.72	2.35															
	8.58	.406	0.031	-0.089	-0.0011	3.82															
47	-1.39	-0.020	0.046	.024	-0.0003	---									1.07	.040	.0346	.010	-0.0017	4.16	
	-2.13	-0.085	0.046	0	-0.0009	4.4									3.39	-0.023	.0023	0.008	10.83	48	
	1.11	.044	0.054	0.046	0	-0.0009	.93								5.39	-0.050	.0008	8.12	6.16		
	2.20	.099	0.078	-0.016	-0.0012	1.97									7.39	-0.050	.0008	8.12	6.16		
	4.33	.205	0.076	-0.036	-0.0015	3.14									10.66	.591	.1196	.218	-0.008	4.11	
	6.46	.308	0.063	-0.017	3.72	2.35															
	8.58	.406	0.031	-0.089	-0.0011	3.82															
48	-1.39	-0.020	0.046	.024	-0.0003	---									1.07	.040	.0346	.010	-0.0017	4.16	
	-2.13	-0.085	0.046	0	-0.0009	4.4									3.39	-0.023	.0023	0.008	10.83	48	
	1.11	.044	0.054	0.046	0	-0.0009	.93								5.39	-0.050	.0008	8.12	6.16		
	2.20	.099	0.078	-0.016	-0.0012	1.97									7.39	-0.050	.0008	8.12	6.16		
	4.33	.205	0.076	-0.036	-0.0015	3.14									10.66	.591	.1196	.218	-0.008	4.11	
	6.46	.308	0.063	-0.017	3.72	2.35															
	8.58	.406	0.031	-0.089	-0.0011	3.82															

TABLE IV. - EXPERIMENTAL PRESSURE COEFFICIENTS, C_p
(a) Basic model, $M = 1.2$

Orifice No.	Angle of attack												Orifice No.	Angle of attack																																																																																																																																																																																																																																																																																																																																																													
	-5°	-1°	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°		-5°	-1°	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°																																																																																																																																																																																																																																																																																																																																															
0	1.354	1.377	1.366	1.368	1.369	1.364	1.368	1.368	1.368	1.376	1.368	1.368	36	-0.103	-0.078	-0.061	-0.062	-0.005	0.061	0.109	0.165	0.208	0.226	0.229	0.229	0.229	0.229	0.229																																																																																																																																																																																																																																																																																																																																															
1	-	-	-	-	-	-	-	-	-	-	-	-	37	-1.15	-0.74	-0.62	-0.30	-0.03	-0.38	-1.01	-1.54	-2.23	-2.50	-2.50	-2.50	-2.50	-2.50	-2.50	-2.50																																																																																																																																																																																																																																																																																																																																														
2	-1.469	-1.456	-1.404	-1.361	-1.329	-1.296	-1.256	-1.207	-1.153	-1.116	-1.066	-1.017	38	-1.16	-1.04	-0.92	-0.53	-0.08	-0.18	-0.74	-1.38	-1.87	-2.37	-2.57	-2.57	-2.57	-2.57	-2.57	-2.57																																																																																																																																																																																																																																																																																																																																														
3	-1.409	-1.395	-1.346	-1.303	-1.260	-1.229	-1.180	-1.137	-1.085	-1.035	-0.980	-0.927	39	-1.14	-1.17	-1.02	-0.59	-0.09	-0.03	-0.46	-0.97	-1.35	-1.85	-2.35	-2.55	-2.55	-2.55	-2.55	-2.55	-2.55																																																																																																																																																																																																																																																																																																																																													
4	-1.367	-1.356	-1.311	-1.267	-1.233	-1.190	-1.140	-1.089	-1.035	-0.987	-0.926	-0.867	40	-1.12	-1.16	-1.02	-0.57	-0.07	-0.03	-0.44	-0.97	-1.33	-1.83	-2.33	-2.53	-2.53	-2.53	-2.53	-2.53	-2.53																																																																																																																																																																																																																																																																																																																																													
5	-1.350	-1.360	-1.315	-1.262	-1.228	-1.183	-1.138	-1.085	-1.035	-0.987	-0.926	-0.867	41	-1.10	-1.14	-1.00	-0.55	-0.05	-0.02	-0.42	-0.97	-1.31	-1.79	-2.29	-2.49	-2.49	-2.49	-2.49	-2.49	-2.49																																																																																																																																																																																																																																																																																																																																													
6	-1.322	-1.328	-1.281	-1.247	-1.213	-1.168	-1.123	-1.070	-1.015	-0.965	-0.905	-0.845	42	-1.09	-1.05	-0.92	-0.49	-0.04	-0.01	-0.39	-0.97	-1.30	-1.70	-2.19	-2.39	-2.39	-2.39	-2.39	-2.39	-2.39																																																																																																																																																																																																																																																																																																																																													
7	-1.343	-1.357	-1.307	-1.261	-1.226	-1.179	-1.134	-1.080	-1.025	-0.975	-0.915	-0.855	43	-1.08	-1.04	-0.91	-0.48	-0.03	-0.00	-0.38	-0.97	-1.27	-1.67	-2.17	-2.37	-2.37	-2.37	-2.37	-2.37	-2.37																																																																																																																																																																																																																																																																																																																																													
8	-1.316	-1.325	-1.279	-1.243	-1.208	-1.163	-1.118	-1.063	-1.008	-0.953	-0.893	-0.833	44	-1.07	-1.03	-0.90	-0.47	-0.02	-0.00	-0.37	-0.97	-1.26	-1.66	-2.16	-2.36	-2.36	-2.36	-2.36	-2.36	-2.36																																																																																																																																																																																																																																																																																																																																													
9	-1.306	-1.305	-1.267	-1.232	-1.197	-1.152	-1.107	-1.052	-0.997	-0.942	-0.882	-0.822	45	-1.06	-1.02	-0.89	-0.46	-0.01	-0.00	-0.36	-0.97	-1.25	-1.65	-2.15	-2.35	-2.35	-2.35	-2.35	-2.35	-2.35																																																																																																																																																																																																																																																																																																																																													
10	-1.299	-0.018	-0.003	-0.018	-0.035	-0.070	-0.094	-0.112	-0.147	-0.179	-0.209	-0.239	46	-1.05	-1.01	-0.88	-0.45	-0.00	-0.00	-0.35	-0.97	-1.24	-1.64	-2.14	-2.34	-2.34	-2.34	-2.34	-2.34	-2.34																																																																																																																																																																																																																																																																																																																																													
11	-	-	-	-	-	-	-	-	-	-	-	-	47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																																																																																																																																																																																																																																																																																																																																													
12	-1.09	-1.18	-1.161	-1.213	-1.268	-1.303	-1.351	-1.377	-1.414	-1.451	-1.488	-1.525	48	-1.04	-1.01	-0.88	-0.44	-0.00	-0.00	-0.34	-0.97	-1.23	-1.63	-2.13	-2.33	-2.33	-2.33	-2.33	-2.33	-2.33																																																																																																																																																																																																																																																																																																																																													
13	-1.093	-0.066	-0.047	-0.017	-0.008	-0.040	-0.097	-0.145	-0.187	-0.220	-0.253	-0.286	49	-1.03	-1.00	-0.87	-0.43	-0.00	-0.00	-0.33	-0.97	-1.22	-1.62	-2.12	-2.32	-2.32	-2.32	-2.32	-2.32	-2.32																																																																																																																																																																																																																																																																																																																																													
14	-1.078	-0.023	-0.034	-0.015	-0.008	-0.045	-0.088	-0.132	-0.175	-0.208	-0.241	-0.274	50	-1.02	-0.99	-0.86	-0.42	-0.00	-0.00	-0.32	-0.97	-1.21	-1.61	-2.11	-2.31	-2.31	-2.31	-2.31	-2.31	-2.31																																																																																																																																																																																																																																																																																																																																													
15	-1.038	-0.239	-0.237	-0.245	-0.253	-0.260	-0.267	-0.274	-0.281	-0.288	-0.295	-0.302	51	-1.01	-0.96	-0.91	-0.40	-0.00	-0.00	-0.31	-0.97	-1.20	-1.60	-2.10	-2.30	-2.30	-2.30	-2.30	-2.30	-2.30																																																																																																																																																																																																																																																																																																																																													
16	-1.050	-0.056	-0.037	-0.008	-0.014	-0.026	-0.056	-0.102	-0.140	-0.178	-0.217	-0.251	52	-1.00	-0.95	-0.90	-0.39	-0.00	-0.00	-0.30	-0.97	-1.19	-1.59	-2.09	-2.29	-2.29	-2.29	-2.29	-2.29	-2.29																																																																																																																																																																																																																																																																																																																																													
17	-1.015	-0.342	-0.339	-0.344	-0.351	-0.358	-0.365	-0.372	-0.379	-0.386	-0.393	-0.399	53	-0.99	-0.94	-0.89	-0.38	-0.00	-0.00	-0.29	-0.97	-1.18	-1.58	-2.08	-2.28	-2.28	-2.28	-2.28	-2.28	-2.28																																																																																																																																																																																																																																																																																																																																													
18	-1.008	-0.085	-0.136	-0.183	-0.222	-0.260	-0.298	-0.336	-0.364	-0.392	-0.410	-0.428	54	-0.98	-0.93	-0.88	-0.37	-0.00	-0.00	-0.28	-0.97	-1.17	-1.57	-2.07	-2.27	-2.27	-2.27	-2.27	-2.27	-2.27																																																																																																																																																																																																																																																																																																																																													
19	-	-	-	-	-	-	-	-	-	-	-	-	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																																																																																																																																																																																																																																																																																																																																													
20	-1.114	-1.178	-1.209	-1.239	-1.268	-1.302	-1.338	-1.368	-1.402	-1.434	-1.464	-1.494	56	-1.08	-1.04	-0.90	-0.46	-0.00	-0.00	-0.28	-0.97	-1.16	-1.56	-2.06	-2.26	-2.26	-2.26	-2.26	-2.26	-2.26																																																																																																																																																																																																																																																																																																																																													
21	-0.984	-0.066	-0.047	-0.017	-0.008	-0.045	-0.087	-0.131	-0.171	-0.207	-0.241	-0.271	57	-0.96	-0.91	-0.86	-0.36	-0.00	-0.00	-0.27	-0.97	-1.15	-1.55	-2.05	-2.25	-2.25	-2.25	-2.25	-2.25	-2.25																																																																																																																																																																																																																																																																																																																																													
22	-0.974	-0.046	-0.027	-0.008	-0.015	-0.045	-0.087	-0.132	-0.172	-0.208	-0.242	-0.272	58	-0.95	-0.90	-0.85	-0.35	-0.00	-0.00	-0.26	-0.97	-1.14	-1.54	-2.04	-2.24	-2.24	-2.24	-2.24	-2.24	-2.24																																																																																																																																																																																																																																																																																																																																													
23	-0.969	-0.026	-0.011	-0.008	-0.020	-0.050	-0.094	-0.138	-0.173	-0.209	-0.243	-0.273	59	-0.94	-0.89	-0.84	-0.34	-0.00	-0.00	-0.25	-0.97	-1.13	-1.53	-2.03	-2.23	-2.23	-2.23	-2.23	-2.23	-2.23																																																																																																																																																																																																																																																																																																																																													
24	-0.973	-0.010	-0.017	-0.018	-0.026	-0.056	-0.096	-0.130	-0.165	-0.200	-0.235	-0.265	60	-0.92	-0.88	-0.83	-0.33	-0.00	-0.00	-0.24	-0.97	-1.12	-1.52	-2.02	-2.22	-2.22	-2.22	-2.22	-2.22	-2.22																																																																																																																																																																																																																																																																																																																																													
25	-0.973	-0.007	-0.037	-0.060	-0.081	-0.128	-0.159	-0.193	-0.235	-0.271	-0.301	-0.331	61	-0.90	-0.86	-0.81	-0.32	-0.00	-0.00	-0.23	-0.97	-1.11	-1.51	-2.01	-2.21	-2.21	-2.21	-2.21	-2.21	-2.21																																																																																																																																																																																																																																																																																																																																													
26	-	-	-	-	-	-	-	-	-	-	-	-	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																																																																																																																																																																																																																																																																																																																																													
27	-	-	-	-	-	-	-	-	-	-	-	-	63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																																																																																																																																																																																																																																																																																																																																													
28	-1.264	-1.113	-1.302	-1.330	-1.344	-1.366	-1.383	-1.402	-1.424	-1.447	-1.473	-1.503	64	-1.24	-1.20	-1.16	-1.12	-1.08	-1.04	-1.00	-0.96	-0.92	-0.88	-0.84	-0.80	65	-1.22	-1.18	-1.14	-1.10	-1.06	-1.02	-0.98	-0.94	-0.90	-0.86	-0.82	-0.78	66	-1.20	-1.16	-1.12	-1.08	-1.04	-1.00	-0.96	-0.92	-0.88	-0.84	-0.80	-0.76	67	-1.18	-1.14	-1.10	-1.06	-1.02	-0.98	-0.94	-0.90	-0.86	-0.82	-0.78	-0.74	68	-1.16	-1.12	-1.08	-1.04	-1.00	-0.96	-0.92	-0.88	-0.84	-0.80	-0.76	-0.72	69	-1.14	-1.10	-1.06	-1.02	-0.98	-0.94	-0.90	-0.86	-0.82	-0.78	-0.74	-0.70	70	-1.12	-1.08	-1.04	-1.00	-0.96	-0.92	-0.88	-0.84	-0.80	-0.76	-0.72	-0.68	71	-1.10	-1.06	-1.02	-0.98	-0.94	-0.90	-0.86	-0.82	-0.78	-0.74	-0.70	-0.66	72	-1.08	-1.04	-1.00	-0.96	-0.92	-0.88	-0.84	-0.80	-0.76	-0.72	-0.68	-0.64	73	-1.06	-1.02	-0.98	-0.94	-0.90	-0.86	-0.82	-0.78	-0.74	-0.70	-0.66	-0.62	74	-1.04	-1.00	-0.96	-0.92	-0.88	-0.84	-0.80	-0.76	-0.72	-0.68	-0.64	-0.60	75	-1.02	-0.98	-0.94	-0.90	-0.86	-0.82	-0.78	-0.74	-0.70	-0.66	-0.62	-0.58	76	-1.00	-0.96	-0.92	-0.88	-0.84	-0.80	-0.76	-0.72	-0.68	-0.64	-0.60	-0.56	77	-0.98	-0.94	-0.90	-0.86	-0.82	-0.78	-0.74	-0.70	-0.66	-0.62	-0.58	-0.54	78	-0.96	-0.92	-0.88	-0.84	-0.80	-0.76	-0.72	-0.68	-0.64	-0.60	-0.56	-0.52	79	-0.94	-0.90	-0.86	-0.82	-0.78	-0.74	-0.70	-0.66	-0.62	-0.58	-0.54	-0.50	80	-0.92	-0.88	-0.84	-0.80	-0.76	-0.72	-0.68	-0.64	-0.60	-0.56	-0.52	-0.48	81	-0.90	-0.86	-0.82	-0.78	-0.74	-0.70	-0.66	-0.62	-0.58	-0.54	-0.50	-0.46	82	-0.88	-0.84	-0.80	-0.76	-0.72	-0.68	-0.64	-0.60	-0.56	-0.52	-0.48	-0.44	83	-0.86	-0.82	-0.78	-0.74	-0.70	-0.66	-0.62	-0.58	-0.54	-0.50	-0.46	-0.42	84	-0.84	-0.80	-0.76	-0.72	-0.68	-0.64	-0.60	-0.56	-0.52	-0.48	-0.44	-0.40	85	-0.82	-0.78	-0.74	-0.70	-0.66	-0.62	-0.58	-0.54	-0.50	-0.46	-0.42	-0.38	86	-0.80	-0.76	-0.72	-0.68	-0.64	-0.60	-0.56	-0.52	-0.48	-0.44	-0.40	-0.36	87	-0.78	-0.74	-0.70	-0.66	-0.62	-0.58	-0.54	-0.50	-0.46	-0.42	-0.38	-0.34	88	-0.76	-0.72	-0.68	-0.64	-0.60	-0.56	-0.52	-0.48	-0.44	-0.40	-0.36	-0.32	89	-0.74	-0.70	-0.66	-0.62	-0.58	-0.54	-0.50	-0.46	-0.42	-0.38	-0.34	-0.30	90	-0.72	-0.68	-0.64	-0.60	-0.56	-0.52	-0.48	-0.44	-0.40	-0.36	-0.32	-0.28</

TABLE IV.- CONTINUED
(b) Basic model, $M = 1.3$



Orifice No	Angle of Attack											
	-5°	-1°	0°	1°	2°	4°	6°	8°	10°	12°	14°	
67	-	-	-	-	-	-	-	-	-	-	-	
68	-	-0.098	-0.159	-0.191	-0.163	-0.178	-0.207	-0.236	-0.265	-0.294	-0.323	
69	-	-0.072	-0.098	-0.111	-0.131	-0.146	-0.178	-0.199	-0.214	-0.237	-0.268	
70	-	-	-	-	-	-	-	-	-	-	-	
71	-	-	-	-	-	-	-	-	-	-	-	
72	-	-0.099	-0.200	-0.198	-0.150	-0.101	-0.029	-0.065	-0.156	-0.233	-0.310	
73	-	-0.070	-0.177	-0.160	-0.109	-0.068	-0.001	0.073	0.156	0.219	0.286	
74	-	-	-	-	-	-	-	-	-	-	-	
75	-	-0.011	-0.193	-0.170	-0.138	-0.118	-0.067	-0.111	-0.192	-0.263	-0.366	
76	-	-0.010	-0.193	-0.176	-0.136	-0.117	-0.069	-0.107	-0.193	-0.264	-0.365	
77	-	-0.016	-0.203	-0.188	-0.148	-0.126	-0.079	-0.126	-0.197	-0.271	-0.363	
78	-	-0.015	-0.194	-0.177	-0.137	-0.118	-0.063	-0.108	-0.183	-0.256	-0.353	
79	-	-0.017	-0.192	-0.178	-0.140	-0.120	-0.074	-0.118	-0.190	-0.261	-0.354	
80	-	-0.010	-0.196	-0.182	-0.147	-0.128	-0.077	-0.122	-0.195	-0.267	-0.358	
81	-	-0.010	-0.196	-0.182	-0.147	-0.128	-0.077	-0.122	-0.195	-0.267	-0.358	
82	-	-0.010	-0.196	-0.182	-0.147	-0.128	-0.077	-0.122	-0.195	-0.267	-0.358	
83	-	-0.004	-0.191	-0.170	-0.139	-0.121	-0.073	-0.114	-0.184	-0.254	-0.345	
84	-	-0.004	-0.191	-0.170	-0.139	-0.121	-0.073	-0.114	-0.184	-0.254	-0.345	
85	-	-0.004	-0.191	-0.170	-0.139	-0.121	-0.073	-0.114	-0.184	-0.254	-0.345	
86	-	-0.004	-0.191	-0.170	-0.139	-0.121	-0.073	-0.114	-0.184	-0.254	-0.345	
87	-	-0.004	-0.191	-0.170	-0.139	-0.121	-0.073	-0.114	-0.184	-0.254	-0.345	
88	-	-0.004	-0.191	-0.170	-0.139	-0.121	-0.073	-0.114	-0.184	-0.254	-0.345	
89	-	-0.004	-0.191	-0.170	-0.139	-0.121	-0.073	-0.114	-0.184	-0.254	-0.345	
90	-	-0.004	-0.191	-0.170	-0.139	-0.121	-0.073	-0.114	-0.184	-0.254	-0.345	
91	-	-0.004	-0.191	-0.170	-0.139	-0.121	-0.073	-0.114	-0.184	-0.254	-0.345	
92	-	-0.004	-0.191	-0.170	-0.139	-0.121	-0.073	-0.114	-0.184	-0.254	-0.345	
93	-	-0.004	-0.191	-0.170	-0.139	-0.121	-0.073	-0.114	-0.184	-0.254	-0.345	
94	-	-0.004	-0.191	-0.170	-0.139	-0.121	-0.073	-0.114	-0.184	-0.254	-0.345	
95	-	-0.004	-0.191	-0.170	-0.139	-0.121	-0.073	-0.114	-0.184	-0.254	-0.345	
96	-	-0.004	-0.191	-0.170	-0.139	-0.121	-0.073	-0.114	-0.184	-0.254	-0.345	
97	-	-0.004	-0.191	-0.170	-0.139	-0.121	-0.073	-0.114	-0.184	-0.254	-0.345	
98	-	-0.004	-0.191	-0.170	-0.139	-0.121	-0.073	-0.114	-0.184	-0.254	-0.345	

TABLE III.—CONTINUED
(c) Tests 24 through 38

TABLE III.—CONCLUDED
(a) Tests 39 through 48

TABLE IV. - EXPERIMENTAL PRESSURE COEFFICIENTS, C_p
(a) Basic model, $M = 1.2$

Orifice No.	Angle of attack												Orifice No.	Angle of attack											
	-5°	-1°	0°	1°	5°	4°	6°	8°	10°	12°	-5°	-1°	0°	1°	2°	4°	6°	8°	10°	12°	-5°	-1°	0°	1°	
0	1.354	1.377	1.366	1.368	1.399	1.394	1.398	1.398	1.376	1.398	1.013	1.078	-0.061	0.062	-0.005	0.061	1.059	1.059	1.028	0.995	1.028	1.028	1.028	0.995	
1	-	-	-	-	-	-	-	-	-	-	-1.15	-0.74	-0.062	-0.030	-0.003	-0.036	-1.01	-1.04	-2.23	-2.23	-2.23	-2.23	-2.23	-2.23	
2	-1.469	-1.456	-1.404	-1.361	-1.329	-1.306	-1.256	-1.207	-1.153	-1.116	-1.464	-1.404	-1.046	-0.985	-0.933	-0.938	-1.08	-1.08	-1.07	-1.07	-1.07	-1.07	-1.07	-1.07	
3	-1.409	-1.395	-1.366	-1.353	-1.320	-1.289	-1.260	-1.247	-1.206	-1.174	-1.411	-1.366	-1.305	-1.271	-1.265	-1.265	-1.265	-1.265	-1.265	-1.265	-1.265	-1.265	-1.265		
4	-1.607	-1.596	-1.561	-1.567	-1.533	-1.494	-1.460	-1.420	-1.385	-1.357	-1.641	-1.596	-1.547	-1.505	-1.477	-1.477	-1.477	-1.477	-1.477	-1.477	-1.477	-1.477	-1.477		
5	-1.560	-1.560	-1.525	-1.476	-1.426	-1.363	-1.329	-1.288	-1.246	-1.205	-1.526	-1.560	-1.516	-1.476	-1.435	-1.435	-1.435	-1.435	-1.435	-1.435	-1.435	-1.435	-1.435		
6	-1.022	-0.988	-0.931	-0.966	-1.113	-1.146	-1.168	-1.198	-1.197	-1.200	-1.396	-1.350	-1.329	-1.305	-1.273	-1.273	-1.273	-1.273	-1.273	-1.273	-1.273	-1.273	-1.273		
7	-1.343	-1.357	-1.406	-1.417	-1.451	-1.447	-1.446	-1.445	-1.445	-1.445	-1.672	-1.626	-1.587	-1.547	-1.505	-1.505	-1.505	-1.505	-1.505	-1.505	-1.505	-1.505	-1.505		
8	-1.106	-1.048	-0.972	-1.033	-1.068	-1.088	-1.126	-1.160	-1.160	-1.160	-1.286	-1.250	-1.211	-1.174	-1.137	-1.137	-1.137	-1.137	-1.137	-1.137	-1.137	-1.137	-1.137		
9	-0.002	-0.034	-0.049	-0.088	-0.088	-0.126	-0.160	-0.160	-0.160	-0.160	-0.392	-0.357	-0.329	-0.297	-0.261	-0.261	-0.261	-0.261	-0.261	-0.261	-0.261	-0.261	-0.261		
10	-0.099	0.018	-0.003	-0.018	-0.055	-0.070	-0.094	-0.112	-0.147	-0.159	-0.398	-0.351	-0.333	-0.304	-0.277	-0.277	-0.277	-0.277	-0.277	-0.277	-0.277	-0.277	-0.277		
11	-	-	-	-	-	-	-	-	-	-	-1.179	-1.050	-1.028	-1.018	-1.018	-1.018	-1.018	-1.018	-1.018	-1.018	-1.018	-1.018	-1.018		
12	-1.049	-1.158	-1.161	-1.213	-1.268	-1.363	-1.361	-1.361	-1.361	-1.361	-1.674	-1.626	-1.589	-1.547	-1.505	-1.505	-1.505	-1.505	-1.505	-1.505	-1.505	-1.505	-1.505		
13	-1.093	-0.966	-0.947	-0.917	-0.908	-0.907	-0.898	-0.898	-0.898	-0.898	-1.667	-1.620	-1.587	-1.547	-1.505	-1.505	-1.505	-1.505	-1.505	-1.505	-1.505	-1.505	-1.505		
14	-0.078	-0.023	-0.034	-0.015	-0.008	-0.055	-0.056	-0.056	-0.056	-0.056	-1.213	-1.153	-1.125	-1.085	-1.043	-1.043	-1.043	-1.043	-1.043	-1.043	-1.043	-1.043	-1.043		
15	-0.238	-0.239	-0.237	-0.245	-0.245	-0.256	-0.260	-0.260	-0.260	-0.260	-1.268	-1.268	-1.268	-1.268	-1.268	-1.268	-1.268	-1.268	-1.268	-1.268	-1.268	-1.268	-1.268		
16	-1.180	-0.056	-0.037	-0.008	-0.014	-0.056	-0.120	-0.160	-0.207	-0.257	-1.621	-1.599	-1.561	-1.521	-1.481	-1.481	-1.481	-1.481	-1.481	-1.481	-1.481	-1.481	-1.481		
17	-1.215	-0.842	-0.557	-0.299	-0.162	-0.177	-0.119	-0.093	-0.093	-0.093	-1.215	-1.144	-1.084	-1.021	-0.951	-0.951	-0.951	-0.951	-0.951	-0.951	-0.951	-0.951	-0.951		
18	-0.008	-0.083	-1.195	-1.183	-0.222	-0.303	-0.361	-0.444	-0.264	-0.277	-1.215	-1.161	-1.121	-1.072	-0.940	-0.940	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	
19	-	-	-	-	-	-	-	-	-	-	-1.228	-1.161	-1.118	-1.072	-0.940	-0.940	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	
20	-1.114	-1.178	-1.209	-1.239	-1.265	-1.332	-1.388	-1.422	-1.444	-1.477	-1.620	-1.571	-1.520	-1.460	-1.397	-1.397	-1.397	-1.397	-1.397	-1.397	-1.397	-1.397	-1.397		
21	-0.084	-0.066	-0.017	-0.061	-0.053	-0.131	-0.167	-0.207	-0.261	-0.308	-1.215	-1.123	-1.073	-1.019	-0.939	-0.939	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	
22	-0.094	-0.046	-0.022	-0.003	-0.016	-0.073	-0.115	-0.123	-0.157	-0.197	-1.215	-1.178	-1.128	-1.078	-0.999	-0.999	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	
23	-0.069	-0.028	-0.001	-0.082	-0.050	-0.094	-0.125	-0.163	-0.199	-0.226	-1.215	-1.153	-1.106	-1.056	-0.976	-0.976	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	
24	-0.253	-0.010	-0.017	-0.038	-0.056	-0.096	-0.130	-0.169	-0.209	-0.239	-1.215	-1.159	-1.103	-1.056	-0.978	-0.978	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	
25	-0.073	-0.007	-0.037	-0.060	-0.081	-0.128	-0.159	-0.193	-0.235	-0.271	-1.215	-1.161	-1.111	-1.064	-0.985	-0.985	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	
26	-	-	-	-	-	-	-	-	-	-	-1.228	-1.161	-1.118	-1.072	-0.940	-0.940	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	
27	-	-	-	-	-	-	-	-	-	-	-1.247	-1.172	-1.129	-1.084	-0.951	-0.951	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	-1.08	
28	-1.264	-1.313	-1.350	-1.330	-1.344	-1.366	-1.383	-1.395	-1.414	-1.473	-1.620	-1.571	-1.520	-1.460	-1.399	-1.399	-1.399	-1.399	-1.399	-1.399	-1.399	-1.399	-1.399		
29	-1.464	-1.465	-1.464	-1.465	-1.466	-1.466	-1.466	-1.466	-1.466	-1.466	-1.620	-1.571	-1.520	-1.460	-1.399	-1.399	-1.399	-1.399	-1.399	-1.399	-1.399	-1.399	-1.399		
30	-1.473	-1.458	-1.464	-1.466	-1.466	-1.466	-1.466	-1.466	-1.466	-1.466	-1.620	-1.571	-1.520	-1.460	-1.399	-1.399	-1.399	-1.399	-1.399	-1.399	-1.399	-1.399	-1.399		
31	-1.163	-1.115	-1.110	-0.082	-0.088	-0.044	-0.005	-0.043	-0.071	-0.142	-1.215	-1.161	-1.103	-0.650	-0.033	-0.033	-0.033	-0.033	-0.033	-0.033	-0.033	-0.033	-0.033		
32	-1.097	-0.087	-0.046	-0.010	-0.003	-0.041	-0.087	-0.136	-0.194	-0.291	-1.215	-1.161	-1.103	-0.650	-0.076	-0.076	-0.076	-0.076	-0.076	-0.076	-0.076	-0.076	-0.076		
33	-1.111	-0.086	-0.089	-0.060	-0.009	-0.041	-0.113	-0.178	-0.233	-0.300	-1.215	-1.161	-1.103	-0.650	-0.096	-0.096	-0.096	-0.096	-0.096	-0.096	-0.096	-0.096	-0.096		

Orifice No.	Angle of attack													-5°	-1°	0°	1°	2°	4°	6°	8°	10°	12°
67	-	-0.063	-0.131	-0.156	-0.164	-0.184	-0.222	-0.266	-0.320	-0.380	-0.401	-0.431	-	-	-	-	-	-	-	-	-	-	
68	-	-0.009	-0.056	-0.109	-0.128	-0.135	-0.147	-0.173	-0.206	-0.214	-0.214	-0.232	-	-	-	-	-	-	-	-	-	-	
69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
72	-	-3.43	-2.29	-2.08	-1.38	-0.69	-0.13	-0.18	-0.15	-0.15	-0.15	-0.15	-	-	-	-	-	-	-	-	-	-	
73	-	-3.04	-2.00	-1.83	-0.94	-0.23	-0.02	-0.06	-0.17	-0.24	-0.24	-0.24	-	-	-	-	-	-	-	-	-	-	
74	-	-2.23	-1.98	-1.72	-1.18	-0.64	-0.03	-0.01	-0.01	-0.01	-0.01	-0.01	-	-	-	-	-	-	-	-	-	-	
75	-	-2.15	-1.91	-1.74	-1.07	-0.53	-0.10	-0.04	-0.03	-0.03	-0.03	-0.03	-	-	-	-	-	-	-	-	-	-	
76	-	-2.15	-1.96	-1.93	-1.76	-1.70	-1.67	-0.84	-0.84	-0.84	-0.84	-0.84	-	-	-	-	-	-	-	-	-	-	
77	-	-1.69	-1.58	-1.37	-1.16	-0.97	-0.73	-0.41	-0.14	-0.03	-0.03	-0.03	-	-	-	-	-	-	-	-	-	-	
78	-	-1.61	-1.58	-1.37	-1.16	-0.97	-0.73	-0.41	-0.14	-0.03	-0.03	-0.03	-	-	-	-	-	-	-	-	-	-	
79	-	-1.66	-1.72	-1.58	-1.38	-1.04	-0.76	-0.48	-0.18	-0.03	-0.03	-0.03	-	-	-	-	-	-	-	-	-	-	
80	-	-2.24	-2.08	-2.03	-2.03	-2.01	-2.01	-2.01	-2.01	-2.01	-2.01	-2.01	-	-	-	-	-	-	-	-	-	-	-
81	-	-0.043	-0.078	-0.126	-0.156	-0.166	-0.166	-0.166	-0.166														

TABLE IV.- CONTINUED
(b) Basic model, $M = 1.3$

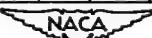
Orifice No.	Angle of attack									Orifice No.	Angle of attack								
	-3°	-1°	0°	1°	3°	5°	8°	10°	15°		-3°	-1°	0°	1°	3°	5°	8°	10°	15°
0	1.436	1.437	1.448	1.449	1.453	1.459	1.474	1.475	1.477	54	-0.104	-0.092	-0.085	-0.076	-0.069	-0.062	-0.056	-0.049	-0.040
1	-	-	-	-	-	-	-	-	-	54A	-0.105	-0.093	-0.086	-0.077	-0.070	-0.063	-0.057	-0.050	-0.041
2	-	-	-	-	-	-	-	-	-	52	-0.110	-0.107	-0.101	-0.096	-0.090	-0.085	-0.077	-0.070	-0.062
3	-	-	-	-	-	-	-	-	-	52A	-0.114	-0.111	-0.106	-0.100	-0.094	-0.088	-0.080	-0.073	-0.065
4	-	-	-	-	-	-	-	-	-	53	-0.118	-0.115	-0.110	-0.104	-0.098	-0.092	-0.085	-0.078	-0.070
5	-	-	-	-	-	-	-	-	-	53A	-0.122	-0.119	-0.114	-0.108	-0.102	-0.096	-0.089	-0.082	-0.074
6	-	-	-	-	-	-	-	-	-	54	-0.127	-0.123	-0.118	-0.112	-0.106	-0.100	-0.093	-0.086	-0.078
7	-	-	-	-	-	-	-	-	-	54A	-0.132	-0.128	-0.123	-0.117	-0.111	-0.105	-0.098	-0.091	-0.083
8	-	-	-	-	-	-	-	-	-	52	-0.136	-0.132	-0.127	-0.121	-0.115	-0.109	-0.102	-0.095	-0.087
9	-	-	-	-	-	-	-	-	-	52A	-0.140	-0.135	-0.130	-0.124	-0.118	-0.112	-0.105	-0.098	-0.090
10	-	-	-	-	-	-	-	-	-	53	-0.144	-0.138	-0.133	-0.127	-0.121	-0.115	-0.108	-0.101	-0.093
11	-	-	-	-	-	-	-	-	-	53A	-0.148	-0.142	-0.137	-0.131	-0.125	-0.119	-0.112	-0.105	-0.097
12	-	-	-	-	-	-	-	-	-	54	-0.152	-0.146	-0.141	-0.135	-0.129	-0.123	-0.116	-0.109	-0.101
13	-	-	-	-	-	-	-	-	-	54A	-0.156	-0.150	-0.145	-0.139	-0.133	-0.127	-0.120	-0.113	-0.105
14	-	-	-	-	-	-	-	-	-	52	-0.160	-0.154	-0.149	-0.143	-0.137	-0.131	-0.124	-0.117	-0.109
15	-	-	-	-	-	-	-	-	-	52A	-0.164	-0.158	-0.153	-0.147	-0.141	-0.135	-0.128	-0.121	-0.113
16	-	-	-	-	-	-	-	-	-	53	-0.168	-0.162	-0.157	-0.151	-0.145	-0.139	-0.132	-0.125	-0.117
17	-	-	-	-	-	-	-	-	-	53A	-0.172	-0.166	-0.161	-0.155	-0.149	-0.143	-0.136	-0.129	-0.121
18	-	-	-	-	-	-	-	-	-	54	-0.176	-0.170	-0.165	-0.159	-0.153	-0.147	-0.140	-0.133	-0.125
19	-	-	-	-	-	-	-	-	-	54A	-0.180	-0.174	-0.169	-0.163	-0.157	-0.151	-0.144	-0.137	-0.129
20	-	-	-	-	-	-	-	-	-	52	-0.184	-0.178	-0.173	-0.167	-0.161	-0.155	-0.148	-0.141	-0.133
21	-	-	-	-	-	-	-	-	-	52A	-0.188	-0.182	-0.177	-0.171	-0.165	-0.159	-0.152	-0.145	-0.137
22	-	-	-	-	-	-	-	-	-	53	-0.192	-0.186	-0.181	-0.175	-0.169	-0.163	-0.156	-0.149	-0.141
23	-	-	-	-	-	-	-	-	-	53A	-0.196	-0.190	-0.185	-0.179	-0.173	-0.167	-0.160	-0.153	-0.145
24	-	-	-	-	-	-	-	-	-	54	-0.200	-0.194	-0.189	-0.183	-0.177	-0.171	-0.164	-0.157	-0.149
25	-	-	-	-	-	-	-	-	-	54A	-0.204	-0.198	-0.193	-0.187	-0.181	-0.175	-0.168	-0.161	-0.153
26	-	-	-	-	-	-	-	-	-	52	-0.208	-0.202	-0.197	-0.191	-0.185	-0.179	-0.172	-0.165	-0.157
27	-	-	-	-	-	-	-	-	-	52A	-0.212	-0.206	-0.201	-0.195	-0.189	-0.183	-0.176	-0.169	-0.161
28	-	-	-	-	-	-	-	-	-	53	-0.216	-0.210	-0.205	-0.200	-0.194	-0.188	-0.181	-0.174	-0.166
29	-	-	-	-	-	-	-	-	-	53A	-0.220	-0.214	-0.209	-0.203	-0.197	-0.191	-0.184	-0.177	-0.169
30	-	-	-	-	-	-	-	-	-	54	-0.224	-0.218	-0.213	-0.207	-0.201	-0.195	-0.188	-0.181	-0.173
31	-	-	-	-	-	-	-	-	-	54A	-0.228	-0.222	-0.217	-0.211	-0.205	-0.199	-0.192	-0.185	-0.177
32	-	-	-	-	-	-	-	-	-	52	-0.232	-0.226	-0.221	-0.215	-0.209	-0.203	-0.196	-0.189	-0.181
33	-	-	-	-	-	-	-	-	-	52A	-0.236	-0.230	-0.225	-0.219	-0.213	-0.207	-0.200	-0.193	-0.185



Orifice No.	Angle of Attack											
	-5°	-1°	0°	1°	2°	4°	6°	8°	10°	12°	14°	
67	-	-	-	-	-	-	-	-	-	-	-	
68	-	-0.98	-0.159	-0.151	-0.163	-0.178	-0.207	-0.236	-0.265	-0.294	-0.323	
69	-	-0.972	-0.98	-0.111	-0.131	-0.146	-0.178	-0.199	-0.214	-0.237	-0.268	
70	-	-	-	-	-	-	-	-	-	-	-	
71	-	-	-	-	-	-	-	-	-	-	-	
72	-	-0.99	-0.29	-0.193	-0.150	-0.101	-0.029	-0.085	-0.155	-0.233	-0.310	
73	-	-0.95	-0.217	-0.160	-0.109	-0.068	-0.011	-0.073	-0.156	-0.219	-0.286	
74	-	-	-	-	-	-	-	-	-	-	-	
75	-	-0.91	-0.193	-0.170	-0.138	-0.118	-0.067	-0.111	-0.179	-0.263	-0.356	
76	-	-0.910	-0.193	-0.176	-0.156	-0.137	-0.100	-0.047	-0.119	-0.196	-0.284	
77	-	-0.916	-0.203	-0.188	-0.178	-0.156	-0.129	-0.076	-0.145	-0.235	-0.325	
78	-	-0.775	-0.154	-0.157	-0.157	-0.163	-0.063	-0.118	-0.193	-0.263	-0.330	
79	-	-0.97	-0.192	-0.176	-0.164	-0.160	-0.108	-0.059	-0.095	-0.167	-0.270	
80	-	-0.910	-0.196	-0.182	-0.167	-0.168	-0.115	-0.077	-0.139	-0.202	-0.288	
81	-	-0.920	-0.196	-0.190	-0.163	-0.163	-0.112	-0.076	-0.137	-0.202	-0.276	
82	-	-0.911	-0.191	-0.180	-0.169	-0.169	-0.111	-0.074	-0.131	-0.194	-0.267	
83	-	-0.908	-0.194	-0.177	-0.169	-0.169	-0.110	-0.074	-0.130	-0.192	-0.265	
84	-	-0.902	-0.193	-0.183	-0.171	-0.170	-0.101	-0.071	-0.125	-0.190	-0.260	
85	-	-0.911	-0.197	-0.176	-0.174	-0.174	-0.125	-0.111	-0.165	-0.232	-0.310	
86	-	-0.906	-0.199	-0.186	-0.179	-0.177	-0.120	-0.089	-0.150	-0.229	-0.309	
87	-	-0.916	-0.197	-0.201	-0.188	-0.188	-0.125	-0.119	-0.168	-0.238	-0.316	
88	-	-0.917	-0.193	-0.207	-0.193	-0.193	-0.144	-0.137	-0.197	-0.267	-0.346	
89	-	-0.918	-0.190	-0.207	-0.193	-0.193	-0.144	-0.137	-0.197	-0.267	-0.346	
90	-	-0.911	-0.199	-0.196	-0.181	-0.181	-0.144	-0.137	-0.197	-0.267	-0.346	
91	-	-0.912	-0.199	-0.196	-0.181	-0.181	-0.144	-0.137	-0.197	-0.267	-0.346	
92	-	-0.913	-0.199	-0.196	-0.181	-0.181	-0.144	-0.137	-0.197	-0.267	-0.346	
93	-	-0.914	-0.199	-0.196	-0.181	-0.181	-0.144	-0.137	-0.197	-0.267	-0.346	
94	-	-0.915	-0.199	-0.196	-0.181	-0.181	-0.144	-0.137	-0.197	-0.267	-0.346	
95	-	-0.916	-0.199	-0.196	-0.181	-0.181	-0.144	-0.137	-0.197	-0.267	-0.346	
96	-	-0.917	-0.199	-0.196	-0.181	-0.181	-0.144	-0.137	-0.197	-0.267	-0.346	
97	-	-0.918	-0.199	-0.196	-0.181	-0.181	-0.144	-0.137	-0.197	-0.267	-0.346	
98	-	-0.919	-0.199	-0.196	-0.181	-0.181	-0.144	-0.137	-0.197	-0.267	-0.346	

TABLE IV.- CONTINUED
(c) Basic model, $M = 1.7$

Orifice No	Angle of attack												Orifice No	Angle of attack												
	-3°	-1°	0°	1°	2°	4°	6°	8°	10°	12°	-3°	-1°	0°	1°	2°	4°	6°	8°	10°	12°	-3°	-1°	0°	1°	2°	
0	1.561	1.587	1.598	1.571	1.599	1.601	1.588	1.575	1.557	1.543	33	-0.063	-0.056	-0.034	-0.012	0.006	0.046	0.097	0.136	0.176	0.224	-	-	-	-	-
1	-	-	-	-	-	-	-	-	-	-	34	-0.011	-0.010	-0.011	-0.024	-0.015	-0.014	-0.075	-0.112	-0.152	-0.204	-	-	-	-	-
2	.507	.457	.439	.405	.376	.334	.291	.246	.207	.167	35	-0.136	-0.127	-0.115	-0.095	-0.072	-0.044	-0.066	-0.089	-0.071	-0.114	-	-	-	-	-
3	.419	.379	.356	.324	.302	.264	.224	.188	.152	.119	36	-0.198	-0.197	-0.191	-0.177	-0.163	-0.150	-0.119	-0.095	-0.067	-0.035	-	-	-	-	-
4	.489	.436	.417	.380	.356	.322	.277	.243	.203	.167	37	-0.178	-0.170	-0.160	-0.150	-0.146	-0.135	-0.181	-0.218	-0.253	-0.297	-	-	-	-	-
5	.631	.581	.561	.521	.500	.466	.415	.355	.322	.281	38	-0.040	-0.011	-0.032	-0.068	-0.100	-0.135	-0.181	-0.218	-0.253	-0.297	-	-	-	-	-
6	.190	.156	.144	.118	.097	.079	.040	.010	-.018	-.041	39	-0.011	-0.054	-0.093	-0.120	-0.146	-0.179	-0.221	-0.261	-0.290	-0.317	-	-	-	-	-
7	-.124	-.150	-.162	-.175	-.189	-.197	-.219	-.230	-.245	-.249	40	-0.023	-0.036	-0.067	-0.110	-0.142	-0.181	-0.227	-0.266	-0.304	-0.337	-	-	-	-	-
8	-.080	-.065	-.059	-.113	-.131	-.103	-.051	-.025	-.003	.008	41	-0.042	-0.009	-0.001	-0.051	-0.143	-0.146	-0.198	-0.243	-0.282	-0.316	-	-	-	-	-
9	.053	.026	.039	.044	.046	.049	.051	.053	.055	.023	42	-0.026	-0.054	-0.067	-0.080	-0.090	-0.114	-0.137	-0.164	-0.234	-0.302	-	-	-	-	-
10	.055	.030	.037	.033	.024	.016	-.010	-.026	-.056	-.067	43	-0.026	-0.062	-0.068	-0.090	-0.106	-0.122	-0.147	-0.170	-0.186	-0.261	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	44	-0.026	-0.051	-0.064	-0.079	-0.088	-0.113	-0.134	-0.152	-0.173	-0.219	-	-	-	-	-
12	.207	.380	.263	.269	.307	.361	.418	.520	.522	.576	45	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	.013	.028	.047	.068	.076	.116	.158	.196	.240	.283	46	-0.018	-0.048	-0.062	-0.078	-0.096	-0.114	-0.138	-0.156	-0.171	-0.192	-	-	-	-	-
14	-.005	.007	.020	.038	.050	.079	.118	.149	.187	.226	47	-0.050	-0.034	-0.004	-0.059	-0.098	-0.195	.299	.366	.441	.513	-	-	-	-	-
15	.195	.179	.176	.166	.161	.165	.169	.168	.175	.188	48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	-.019	-.016	-.005	.020	.029	.063	.112	.148	.194	.240	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	.725	.661	.638	.599	.593	.512	.407	.389	.322	.223	50	-0.150	-0.114	-0.074	-0.036	-0.018	.035	.103	.157	.219	.265	-	-	-	-	-
18	.198	.144	.120	.103	.066	.046	.041	-.073	-.103	-.149	51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-	-	-	52	-0.127	-0.113	-0.093	-0.072	-0.098	-0.103	-0.137	-0.185	-0.244	-	-	-	-	-	-
20	-.073	-.113	-.126	-.148	-.172	-.196	-.219	-.241	-.266	-.288	53	-0.063	-0.083	-0.066	-0.037	-0.019	-0.035	.043	.063	.129	.179	-	-	-	-	-
21	-.036	-.071	-.085	-.106	-.131	-.198	-.190	-.217	-.246	-.273	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	.069	.037	.030	.016	.004	.019	.045	-.072	-.102	-.148	55	-0.049	-0.070	-0.071	-0.059	-0.056	-0.031	-0.006	.041	.080	.128	-	-	-	-	-
23	.093	.021	.038	-.006	-.027	-.039	-.065	-.088	-.109	-.131	56	-0.123	-0.121	-0.109	-0.085	-0.073	-0.044	.003	.040	.075	.121	-	-	-	-	-
24	.054	.024	.008	-.003	-.022	-.034	-.057	-.078	-.104	-.124	57	-0.221	-.157	-.126	-.085	-.015	-0.021	.091	.161	.221	.264	-	-	-	-	-
25	.045	.008	.001	-.015	-.029	-.043	-.069	-.092	-.115	-.140	58	-0.060	-0.005	-0.018	-0.057	-0.088	-0.130	-0.184	-0.230	-0.276	-0.312	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	59	-0.011	-0.057	-0.086	-.113	-.140	-.179	-.220	-.259	-.293	-.342	-	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-	60	-0.005	-0.058	-0.096	-.128	-.156	-.196	-.235	-.269	-.294	-.322	-	-	-	-	-
28	-.123	-.146	-.151	-.161	-.176	-.185	-.203	-.217	-.234	-.254	61	-0.020	-0.040	-0.073	-.116	-.145	-.188	-.239	-.276	-.314	-	-	-	-	-	
29	-.037	.002	.048	.124	.160	.250	.318	.379	.550	.647	62	-0.020	-0.040	-0.073	-.116	-.145	-.188	-.239	-.276	-.314	-	-	-	-	-	
30	-.128	-.160	-.129	-.097	-.076	-.087	-.055	-.111	-.234	-.324	63	-0.035	-0.073	-0.093	-.120	-.147	-.177	-.225	-.252	-.293	-.318	-	-	-	-	-
31	-.171	-.156	-.129	-.085	-.060	-.013	.042	.085	.122	.166	64	-0.026	-0.086	-0.094	-.112	-.118	-.168	-.217	-.244	-.276	-.300	-	-	-	-	-
32	-.046	-.039	-.021	-.005	.004	.033	.075	.109	.150	.196	65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	-.048	-.032	-.019	-.009	.025	.061	.112	.154	.197	.248	66	-0.027	-0.096	-.103	-.119	-.126	-.169	-.222	-.233	-.251	-.282	-	-	-	-	-
34	-.056	-.041	-.030	-.008	.005	.054	.099	.140	.180	.243	67	-0.024	-0.054	-0.080	-.097	-.113	-.135	-.156	-.176	-.205	-.232	-	-	-	-	-
34A	-.071	-.054	-.045	-.005	.001	.048	.097	.141	.181	.233	68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Orifice No	Angle of attack											
	-3°	-1°	0°	1°	2°	4°	6°	8°	10°	12°		
71	-	-	-	-	-	-	-	-	-	-	-	0.349
72	-0.187	-0.158	-0.131	-0.073	-0.041	0.023	0.100	0.168	0.241	0.349	-	-
73	-.174	-.141	-.108	-.051	-.020	0.045	0.111	0.171	0.236	0.304	-	-
74	-.157	-.126	-.106	-.073	-.055	-.016	0.048	0.091	0.144	0.199	-	-
75	-.128	-.124	-.115	-.085	-.072	-.036	0.019	0.059	0.113	0.166	-	-
77	-.141	-.132	-.132	-.109	-.057	-.065	-.003	0.036	0.087	0.140	-	-
78	-.109	-.107	-.102	-.077	-.056	-.017	0.036	0.071	0.112	0.158	-	-
79	-.142	-.140	-.137	-.110	-.058	-.070	-.021	0.018	0.060	0.108	-	-
80	-.149	-.145	-.134	-.111	-.059	-.071	-.027	0.018	0.058	0.099	-	-
81	-.278	-.203	-.160	-.119	-.066	-.021	0.120	0.191	0.241	0.288	-	-.330
82	-.074	-.019	-.013	-.047	-.062	-.135	-.196	-.241	-.281	-.330	-	-
83	-.010	-.041	-.076	-.096	-.132	-.175	-.143	-.271	-.313	-.351	-	-
84	0	-.055	.091	-.111	-.150	-.193	-.150	-.260	-.314	-.352	-	-
85	.017	-.092	-.092	-.118	-.148	-.187	-.142	-.258	-.270	-.325	-	-
86	.005	-.044	-.063	-.133	-.174	-.220	-.162	-.287	-.316	-.347	-	-
87	-.065	-.097	-.115	-.139	-.184	-.231	-.178	-.313	-.340	-.364	-	-
88	-.089	-.110	-.123	-.135	-.173	-.227	-.170	-.305	-.334	-.356	-	-
89	-.094	-.111	-.121	-.129	-.154	-.209	-.153	-.289	-.296	-.301	-	-
90	-.042	-.018	-.058	-.137	-.185	-.263	-.206	-.410	-.476	-.532	-	-
91	-.136	-.111	-.068	-.014	-.030	0.059	0.091	0.223	0.287	0.326	-	-
92	-.184	-.146	-.123	-.070	-.043	0.020	0.057	0.173	0.242	0.309	-	-
93	-.185	-.163	-.124	-.074	-.039	0.019	0.056	0.172	0.235	0.299	-	-
94	-.141	-.140	-.129	-.061	-.054	0.017	0.027	0.111	0.166	0.226	-	-
95	-.187	-.165	-.151	-.112	-.096	-.068	0.022	0.012	0.056	0.091	-	-
96	-.193	-.173	-.166	-.118	-.088	-.068	0.026	0.010	0.046	0.084		

TABLE IV.- CONTINUED
(d) Model with rocket packets, $M = 1.2$

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Orifice No.	Angle of attack					Orifice No.	Angle of attack					Orifice No.	Angle of attack				
	-3°	0°	4°	8°	12°		-3°	0°	4°	8°	12°		-3°	0°	4°	8°	12°
0	1.360	1.375	1.384	1.371	1.384	34	----	----	----	----	----	67	----	----	----	----	----
1	----	----	----	----	----	34A	-.014	.082	.176	.299	.363	68	-.083	-.166	-.246	-.365	-.504
2	.485	.395	.287	.193	.107	35	-.103	-.048	.042	.133	.194	69	-.055	-.151	-.207	-.316	-.407
3	.401	.310	.218	.132	.057	36	-.230	-.164	-.042	.033	.168	70	----	----	----	----	----
4	.608	.569	.436	.307	.212	37	-.248	-.175	-.095	-.019	.032	71	----	----	----	----	----
5	.552	.477	.398	.320	.253	38	-.356	-.333	-.276	-.220	-.198	72	-.368	-.255	-.046	.170	.247
6	-.034	-.094	-.154	-.204	-.250	39	.159	-.123	-.497	-.704	-.745	73	-.347	-.221	-.128	.050	.334
7	-.379	-.426	-.441	-.408	-.418	40	.012	-.189	-.506	-.690	-.729	74	----	----	----	----	----
8	.106	.091	.081	.051	.055	41	.033	-.122	-.430	-.644	-.702	75	-.210	-.121	-.008	.091	.149
9	----	----	----	----	----	42	.030	-.094	-.212	-.560	-.673	76	-.201	-.133	-.037	.042	.107
10	.049	-.013	-.080	-.126	-.174	43	-.016	.112	-.222	-.382	-.646	77	-.163	-.152	-.073	.004	.068
11	----	----	----	----	----	44	-.064	-.155	-.255	-.310	-.333	78	-.173	-.115	-.034	.043	.086
12	.114	.193	.309	.424	.530	45	-.085	-.151	-.227	-.289	-.305	79	-.185	-.151	-.079	-.012	.065
13	-.060	-.036	.060	.157	.245	46	-.059	-.134	-.213	-.267	-.306	80	-.134	-.149	-.113	-.044	.101
14	-.073	-.030	.047	.134	.201	47	----	----	----	----	----	81	.162	-.146	-.577	-.726	-.727
15	.226	.234	.256	.263	.271	48	-.018	-.138	-.194	-.254	-.287	82	.003	-.252	-.576	-.704	-.720
16	.003	.059	.174	.271	.308	49	-.117	.065	.268	.384	.517	83	-.038	-.220	-.557	-.692	-.709
17	.505	.328	.153	-.031	-.162	50	----	----	----	----	----	84	-.025	-.170	-.158	-.619	.682
18	.013	-.153	-.345	-.474	-.575	51	----	----	----	----	----	85	-.040	-.144	-.304	-.527	-.644
19	----	----	----	----	----	52	-.307	-.209	-.058	.164	.299	86	-.110	-.210	-.296	-.445	-.579
20	-.141	-.250	-.381	-.496	-.593	53	-.367	-.243	-.020	.116	.167	87	-.207	-.301	-.373	-.445	-.562
21	.034	-.060	-.135	-.227	-.397	54	-.177	-.108	0	.085	.158	88	-.167	-.244	-.297	-.337	.511
22	.082	.007	-.080	-.167	-.247	55	-.173	-.126	-.049	.015	.071	89	-.109	-.209	-.244	-.276	.493
23	.058	-.016	-.108	-.182	-.256	56	----	----	----	----	----	90	-.297	-.060	.212	.387	.476
24	.044	-.034	-.108	-.183	-.250	57	-.157	-.103	-.029	-.033	.050	91	-.363	-.166	.011	.186	.351
25	.051	-.035	-.125	-.203	-.265	58	-.185	-.157	-.083	-.005	.052	92	-.365	-.247	-.049	.203	.310
26	----	----	----	----	----	59	.129	-.168	-.610	-.753	-.753	93	-.351	-.213	.007	.206	.275
27	----	----	----	----	----	60	.002	-.246	-.577	-.715	-.752	94	-.251	-.110	-.056	.135	.169
28	-.305	-.337	-.336	-.220	-.239	61	-.019	-.210	-.558	-.701	-.729	95	-.252	-.188	-.131	-.051	.017
29	-.400	-.285	-.045	.183	.408	62	-.027	-.143	-.287	-.653	-.708	96	-.202	-.169	-.129	-.050	.025
30	-.394	-.270	-.063	.133	.217	63	-.030	-.139	-.272	-.581	-.668	97	-.147	-.166	-.146	-.067	.002
31	-.155	-.087	-.012	.096	.244	64	-.061	-.157	-.271	-.518	-.642	98	----	----	----	----	----
32	.224	.244	.290	.326	.357	65	-.105	-.203	-.313	-.475	-.635	----	----	----	----	----	
33	-.343	-.285	-.134	.039	.087	66	-.131	-.197	-.301	-.417	-.560	----	----	----	----	----	

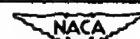


TABLE IV. - CONTINUED
(e) Model with rocket packets, $M = 1.3$

Orifice No.	Angle of attack					Orifice No.	Angle of attack					Orifice No.	Angle of attack				
	-3°	0°	40	80	120		-3°	0°	40	80	120		-3°	0°	40	80	120
0	1.417	1.442	1.440	1.428	1.407	34	----	----	----	----	----	67	----	----	----	----	----
1	----	----	----	----	----	34A	.047	.012	.124	.245	.395	68	-.099	-.139	-.210	-.262	-.414
2	.508	.431	.321	.228	.151	35	-.093	-.046	.041	.134	.236	69	-.060	-.115	-.175	-.226	-.315
3	.419	.346	.247	.163	.083	36	-.209	-.162	-.075	.026	.135	70	----	----	----	----	----
4	.640	.522	.377	.278	.205	37	-.258	-.220	-.128	-.030	.047	71	----	----	----	----	----
5	.585	.518	.417	.337	.266	38	-.320	-.309	-.269	-.222	-.156	72	-.310	-.226	-.092	.146	.268
6	.040	-.012	-.053	-.128	-.176	39	.128	-.023	-.253	-.434	-.551	73	-.325	-.233	-.084	.003	.209
7	-.293	-.334	-.378	-.396	-.371	40	.043	-.105	-.303	-.453	-.550	74	----	----	----	----	----
8	-.020	.057	.065	.081	.055	41	-.011	-.061	-.267	-.444	-.544	75	-.226	-.141	-.040	.082	.178
9	----	----	----	----	----	42	-.008	-.054	-.154	-.353	-.507	76	-.210	-.155	-.065	.038	.125
10	.054	.009	-.050	-.101	-.155	43	.003	-.065	-.155	-.296	-.431	77	-.209	-.171	-.084	.015	.089
11	----	----	----	----	----	44	-.068	-.127	-.204	-.273	-.381	78	-.176	-.124	-.043	.051	.123
12	.143	.226	.325	.445	.561	45	-.084	-.126	-.200	-.265	-.377	79	-.195	-.156	-.075	-.003	.054
13	-.055	-.004	.066	.158	.265	46	-.050	-.107	-.182	-.235	-.356	80	-.194	-.162	-.092	-.035	.024
14	-.055	-.011	.052	.132	.225	47	----	----	----	----	----	81	.180	-.034	-.285	-.453	-.565
15	.220	.231	.232	.252	.267	48	-.062	-.106	-.172	-.238	-.268	82	-.024	-.136	-.348	-.485	-.567
16	-.046	-.009	.085	.231	.348	49	-.226	-.023	.209	.358	.446	83	-.016	-.141	-.358	-.500	-.578
17	.580	.450	.288	.123	-.027	50	----	----	----	----	----	84	.004	-.098	-.315	-.466	-.562
18	.060	-.054	-.192	-.315	-.419	51	----	----	----	----	----	85	-.012	-.086	-.246	-.425	-.524
19	----	----	----	----	----	52	-.274	-.172	-.025	.085	.292	86	-.085	-.138	-.208	-.350	-.464
20	-.139	-.218	-.312	-.409	-.487	53	-.324	-.299	-.170	.053	.183	87	-.174	-.228	-.282	-.358	-.464
21	-.027	-.089	-.196	-.291	-.397	54	-.175	-.115	-.036	.072	.170	88	-.173	-.209	-.229	-.298	-.415
22	.071	.018	-.065	-.137	-.202	55	-.177	-.136	-.064	.021	.095	89	-.140	-.191	-.223	-.238	-.390
23	.054	.005	-.082	-.150	-.209	56	----	----	----	----	----	90	-.227	-.045	-.174	-.357	-.465
24	.041	-.005	-.082	-.150	-.207	57	-.126	-.131	-.087	-.015	.061	91	-.311	-.192	-.013	.154	.300
25	.026	-.020	-.096	-.163	-.219	58	-.173	-.159	-.093	-.017	.062	92	-.321	-.218	-.062	.067	.325
26	----	----	----	----	----	59	.169	-.050	-.316	-.483	-.590	93	-.307	-.236	-.087	.138	.304
27	----	----	----	----	----	60	.025	-.151	-.369	-.511	-.592	94	-.267	-.229	-.086	.073	.193
28	-.260	-.296	-.337	-.408	-.412	61	.006	-.114	-.316	-.468	-.561	95	-.284	-.212	-.136	-.044	.032
29	-.313	-.227	-.019	.214	.443	62	.008	-.093	-.314	-.462	-.559	96	-.266	-.208	-.135	-.042	.032
30	-.345	-.353	-.239	-.036	.190	63	-.008	-.093	-.180	-.418	-.528	97	-.235	-.190	-.131	-.045	.031
31	-.235	-.089	-.030	.062	.171	64	-.042	-.102	-.178	-.348	-.457	98	-.216	-.189	-.134	-.062	.006
32	.230	.283	.327	.361	.397	65	-.095	-.142	-.218	-.322	-.457	66	-.114	-.158	-.228	-.301	-.418
33	-.348	-.303	-.207	-.052	.134												

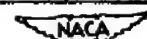
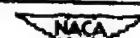


TABLE IV.- CONCLUDED
(f) Model with rocket packets, $M = 1.7$

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Orifice No.	Angle of attack					Orifice No.	Angle of attack					Orifice No.	Angle of attack				
	-3°	0°	4°	8°	12°		-3°	0°	4°	8°	12°		-3°	0°	4°	8°	12°
0	1.573	1.584	1.566	1.578	1.535	33	-.141	-.150	-.115	-.045	.056	65	-.033	-.081	-.168	-.238	-.292
1	----	----	----	----	----	34	----	----	----	----	----	66	-.048	-.084	-.175	-.221	-.276
2	.506	.433	.338	.255	.175	34A	-.026	-.018	.017	.162	.249	67	----	----	----	----	----
3	.420	.351	.263	.190	.119	35	.046	-.029	.049	.166	.271	68	-.063	-.103	-.186	-.219	-.265
4	.489	.413	.314	.241	.172	36	-.039	-.021	.045	.114	.201	69	.019	-.069	-.121	-.163	-.203
5	.633	.556	.454	.367	.285	37	-.171	-.166	-.114	-.044	.060	70	----	----	----	----	----
6	.195	.141	.074	.021	-.030	38	-.183	-.186	-.155	-.101	-.038	71	----	----	----	----	----
7	-.117	-.152	-.186	-.218	-.236	39	.176	.086	-.029	-.139	-.233	72	-.146	-.146	-.059	.115	.275
8	-.062	-.105	-.087	-.030	.006	40	.036	-.032	-.119	-.193	-.262	73	-.215	-.151	-.003	.094	.238
9	----	----	----	----	----	41	-.014	-.089	-.165	-.238	-.294	74	----	----	----	----	----
10	.056	.038	.017	-.023	-.079	42	.028	-.073	-.167	-.245	-.310	75	-.107	-.084	-.015	.072	.193
11	----	----	----	----	----	43	.050	-.008	-.128	-.220	-.290	76	-.117	-.117	-.057	.054	.141
12	.208	.258	.360	.467	.470	44	-.023	-.069	-.115	-.162	-.269	77	-.138	-.137	-.051	.030	.112
13	.017	.047	.111	.191	.246	45	-.026	-.077	-.125	-.163	-.246	78	-.114	-.098	-.015	.058	.144
14	.004	0	.072	.140	.227	46	-.020	-.064	-.112	-.150	-.201	79	-.136	-.120	-.066	.003	.089
15	.193	.124	.170	.173	.189	47	----	----	----	----	----	80	-.137	-.123	-.078	-.003	-.086
16	-.040	-.026	.044	.115	.204	48	-.014	-.063	-.113	-.148	-.181	81	.247	.133	.004	-.156	-.254
17	.723	.636	.488	.391	.222	49	-.029	-.009	-.157	-.365	-.490	82	.057	-.023	-.102	-.220	-.292
18	.199	.128	.046	-.046	-.128	50	----	----	----	----	----	83	.003	-.076	-.168	-.247	-.312
19	----	----	----	----	----	51	----	----	----	----	----	84	-.002	-.084	-.170	-.252	-.312
20	-.090	-.146	-.182	-.289	-.269	52	-.006	.026	.090	.213	.383	85	.015	-.083	-.164	-.232	-.295
21	-.026	-.105	-.149	-.210	-.254	53	-.212	-.185	-.105	-.003	.093	86	-.026	-.082	-.181	-.256	-.302
22	.075	.035	-.016	-.071	-.151	54	-.091	-.052	-.016	.081	.175	87	-.069	-.120	-.206	-.276	-.329
23	.054	-.005	-.059	-.089	-.135	55	-.098	-.092	-.030	.045	.143	88	-.088	-.123	-.207	-.277	-.330
24	.053	-.010	-.059	-.089	-.131	56	----	----	----	----	----	89	-.089	-.124	-.198	-.267	-.296
25	.036	-.008	-.059	-.107	-.144	57	-.010	-.045	-.025	.027	.103	90	.005	.079	.212	.328	.458
26	----	----	----	----	----	58	-.114	-.105	-.049	.026	.113	91	-.100	-.083	.020	.164	.318
27	----	----	----	----	----	59	.221	.115	-.035	-.175	-.270	92	.159	-.133	.006	.128	.285
28	-.113	-.148	-.168	-.215	-.249	60	.062	-.027	-.126	-.223	-.299	93	-.166	-.119	-.012	.108	.247
29	-.027	.060	.237	.376	.640	61	-.005	-.077	-.163	-.241	-.301	94	-.100	-.107	-.052	.051	.187
30	-.081	-.097	.046	.080	.274	62	.004	-.081	-.178	-.249	-.303	95	-.155	-.143	-.080	-.011	.089
31	-.146	-.113	.046	-.077	-.154	63	.023	-.071	-.172	-.253	-.313	96	-.165	-.146	-.086	-.048	.108
32	-.008	-.007	.096	.346	.490	64	.008	-.056	-.155	-.238	-.293	97	-.156	-.143	-.098	.011	.073



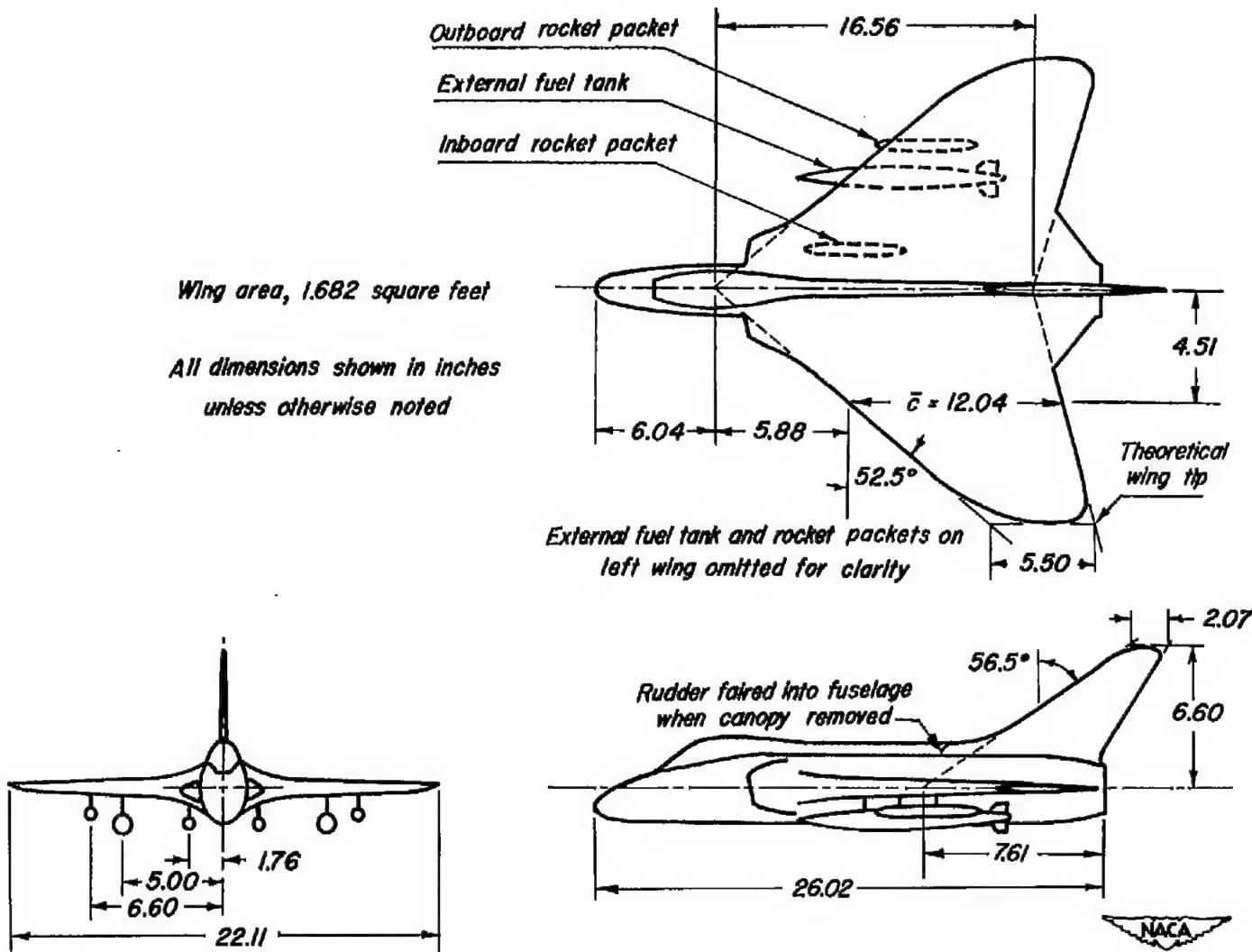
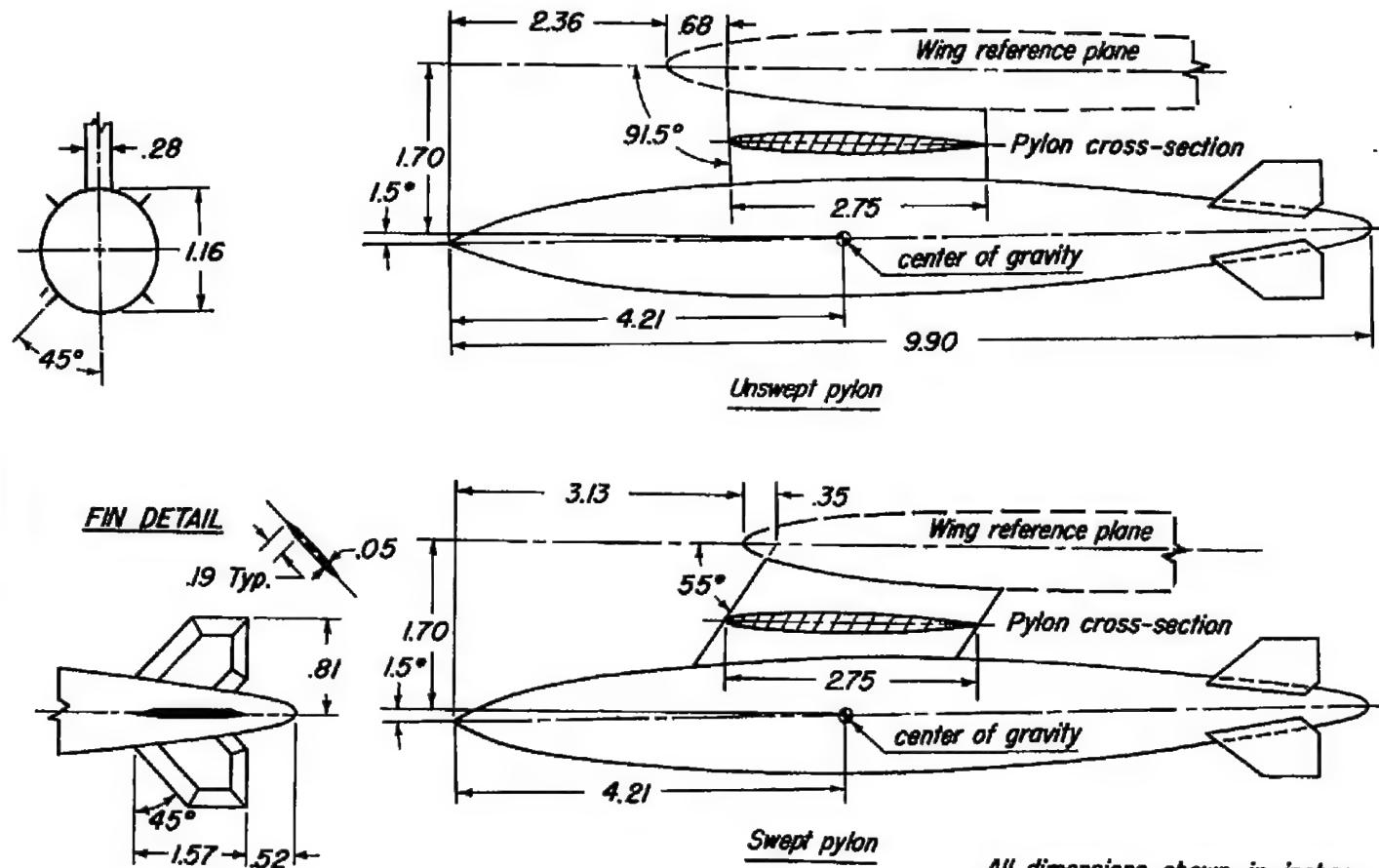


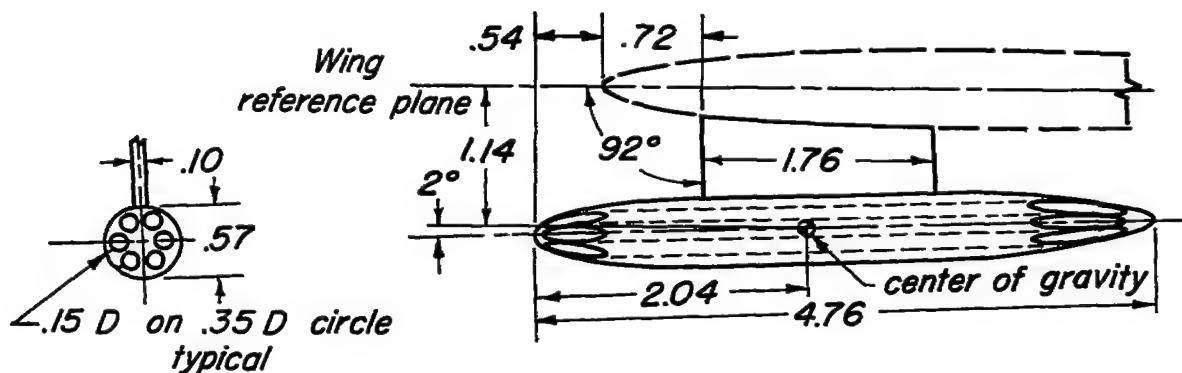
Figure 1.—Three-view drawing of the model showing the external fuel tanks and rocket packets.



All dimensions shown in inches
unless otherwise noted

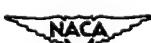
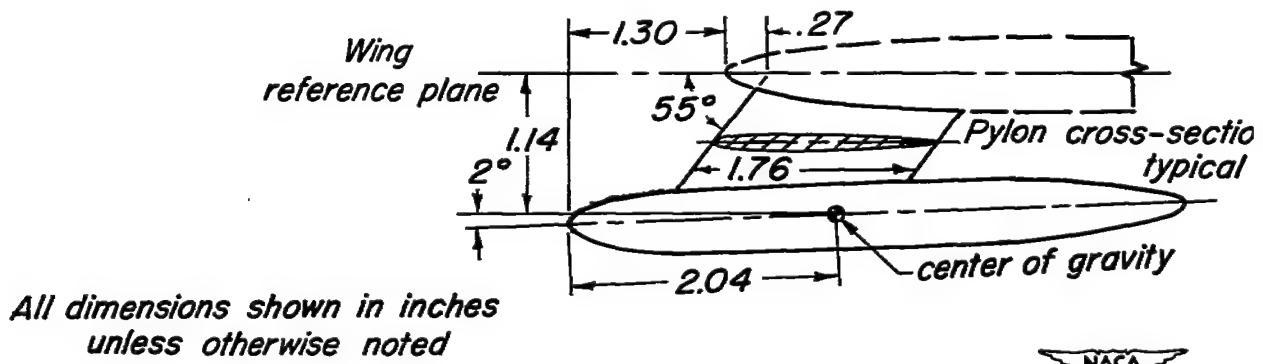


Figure 2.-Details of the external fuel tanks with unswept and swept pylons.



Note: rocket packet shown with open tubes

Unswept pylon

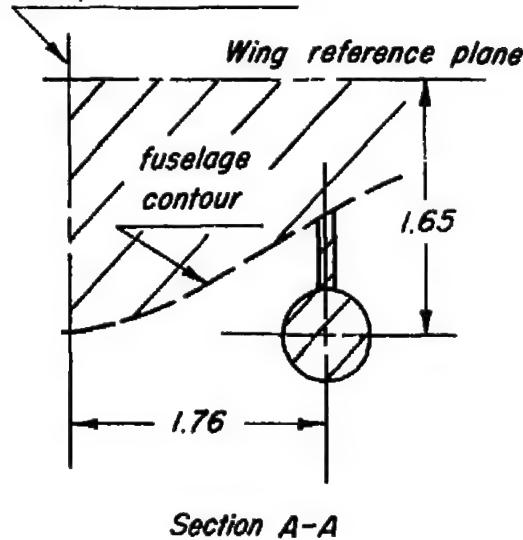


Swept pylon

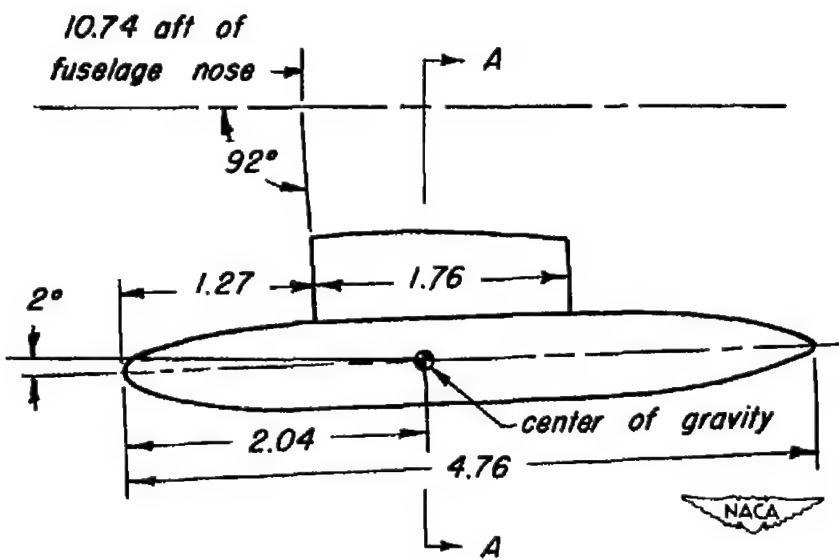
(a) Outboard location.

Figure 3.- Details of the rocket packets with unswept and swept pylons.

Model plane of symmetry



All dimensions shown in inches
unless otherwise noted



(b) Inboard location.

Figure 3. - Concluded.

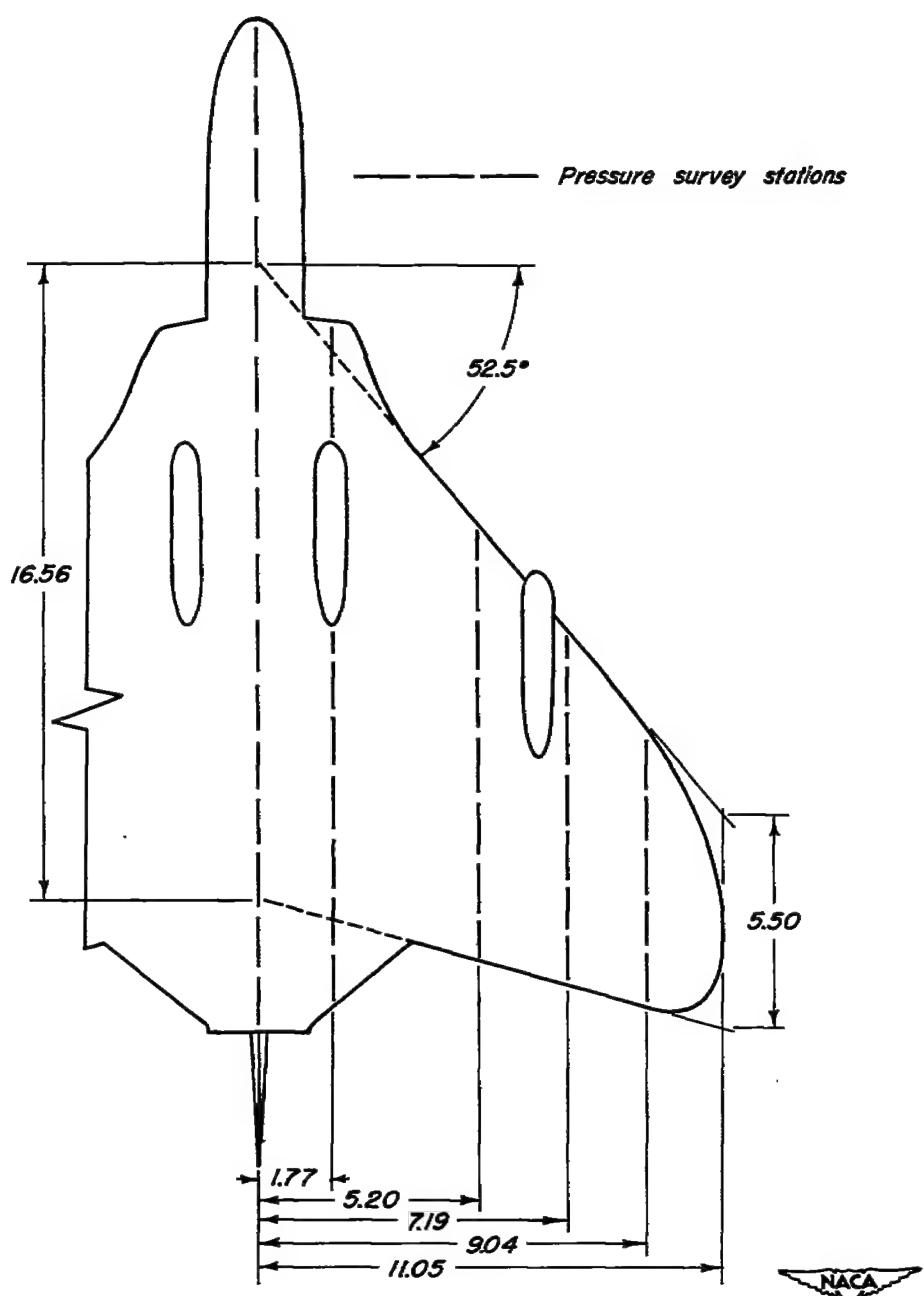


Figure 4. - Dimensional sketch of the lower surface of the model with rocket packets installed, showing the pressure survey station.

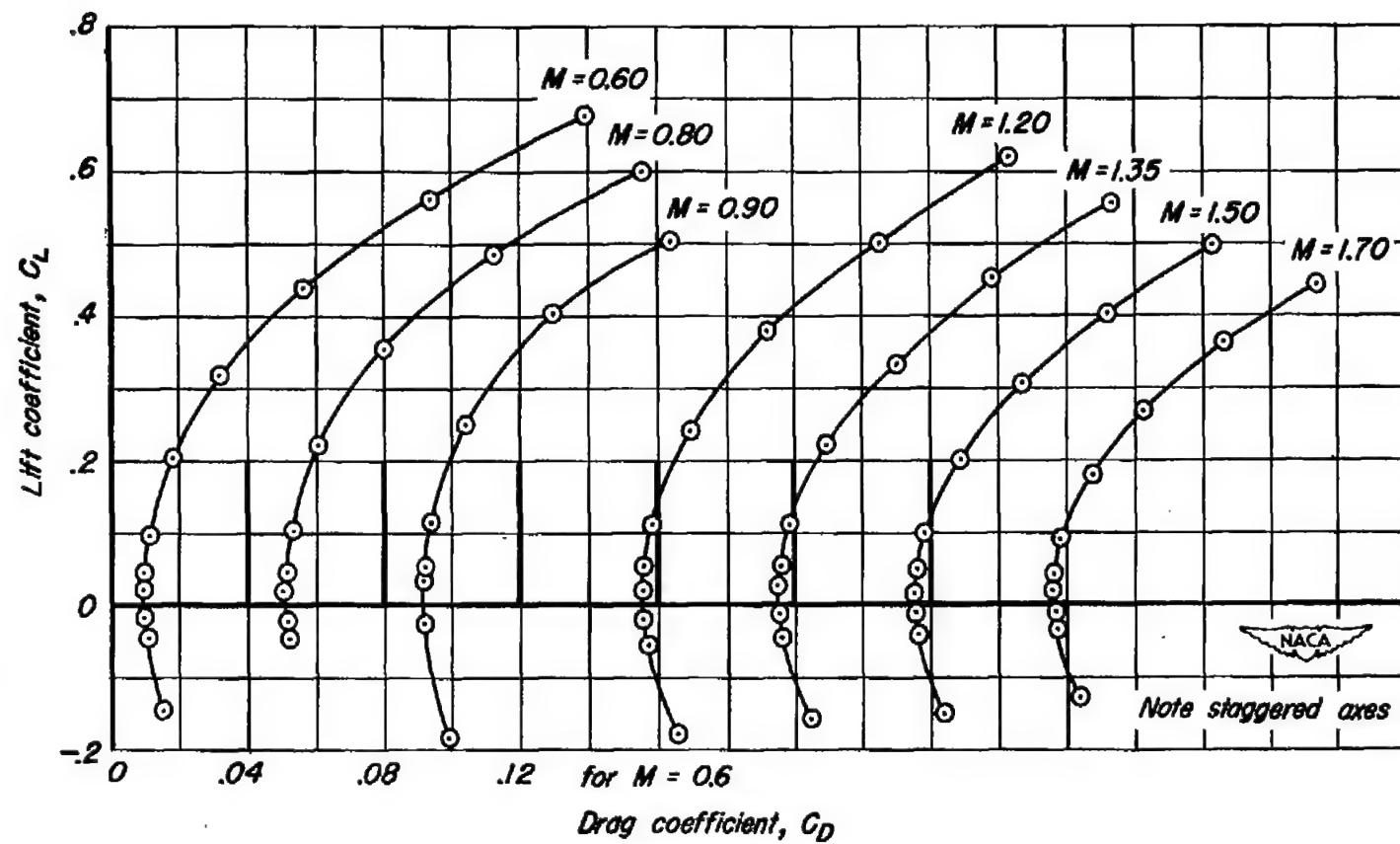


Figure 5.- Variation of drag coefficient with lift coefficient for the basic model.

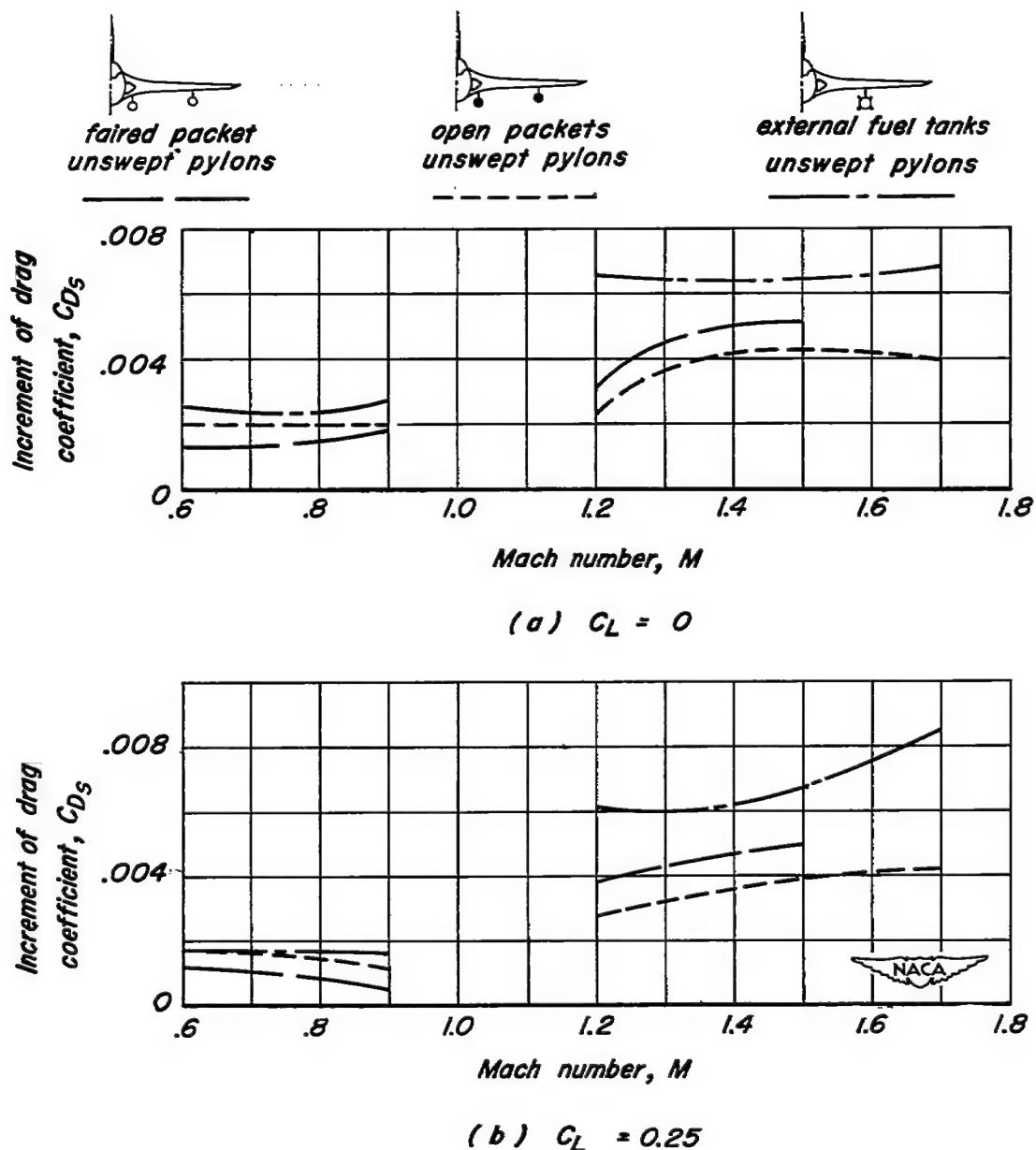


Figure 6.- Variation of increment of drag coefficient with Mach number at 0 and 0.25 lift coefficient for the various external store configurations mounted on the model.

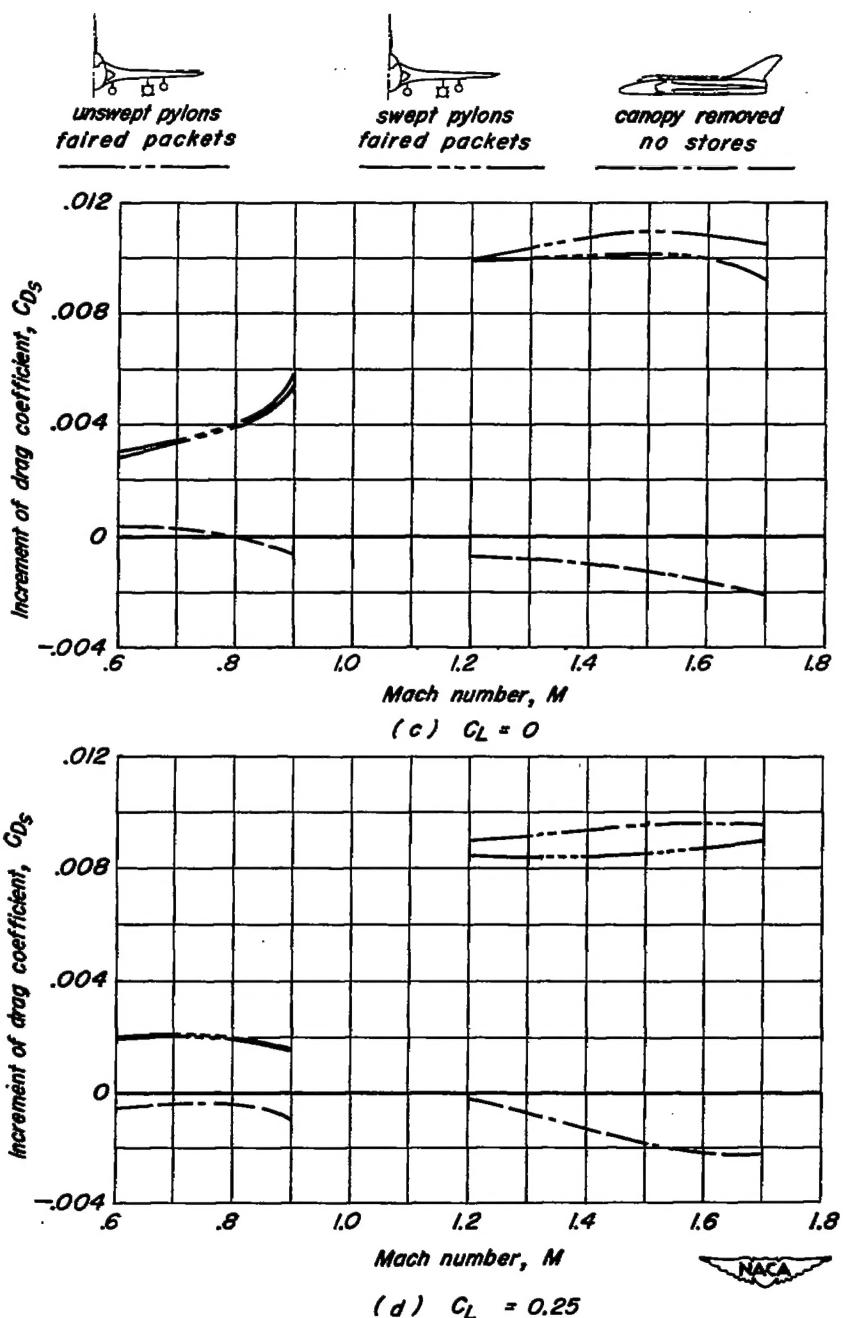


Figure 6.—Concluded.

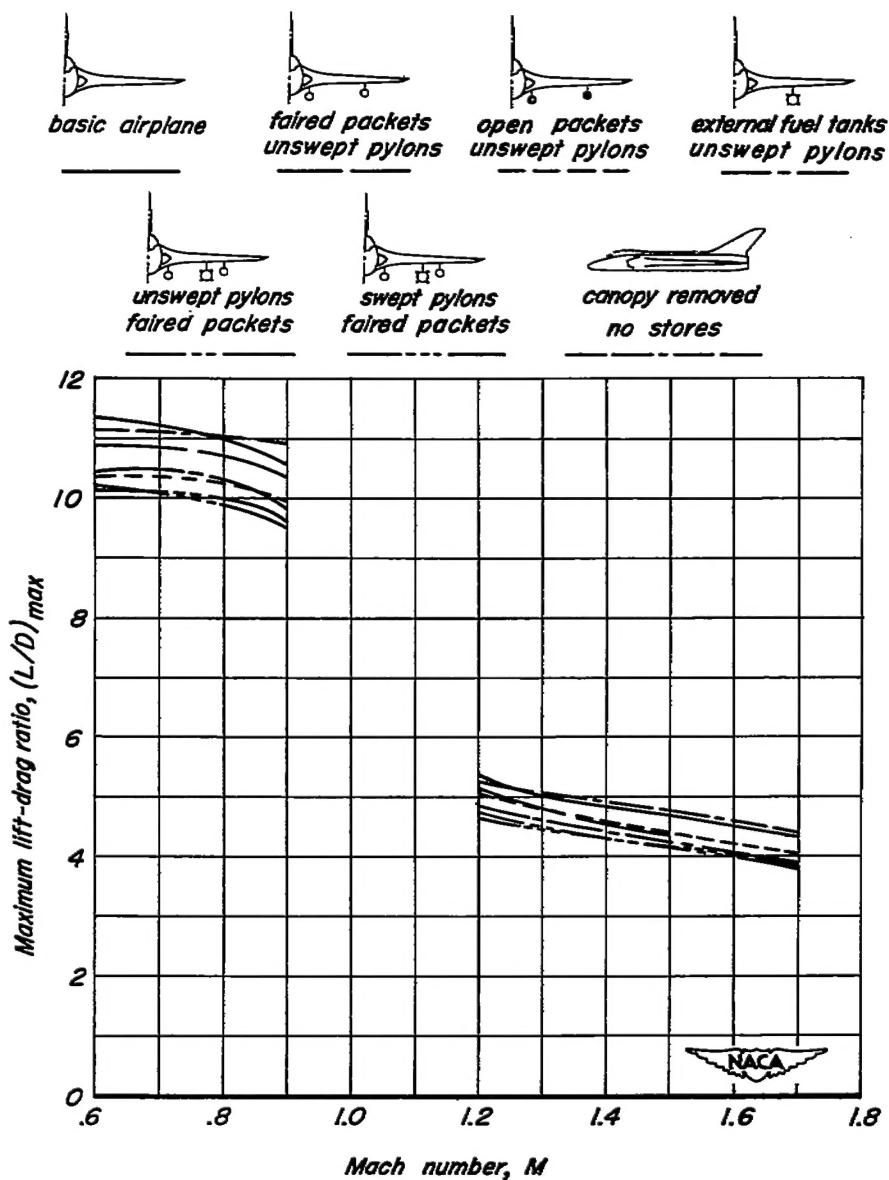


Figure 7.- Variation of the maximum lift-drag ratio with Mach number for the various external store configurations mounted on the model.

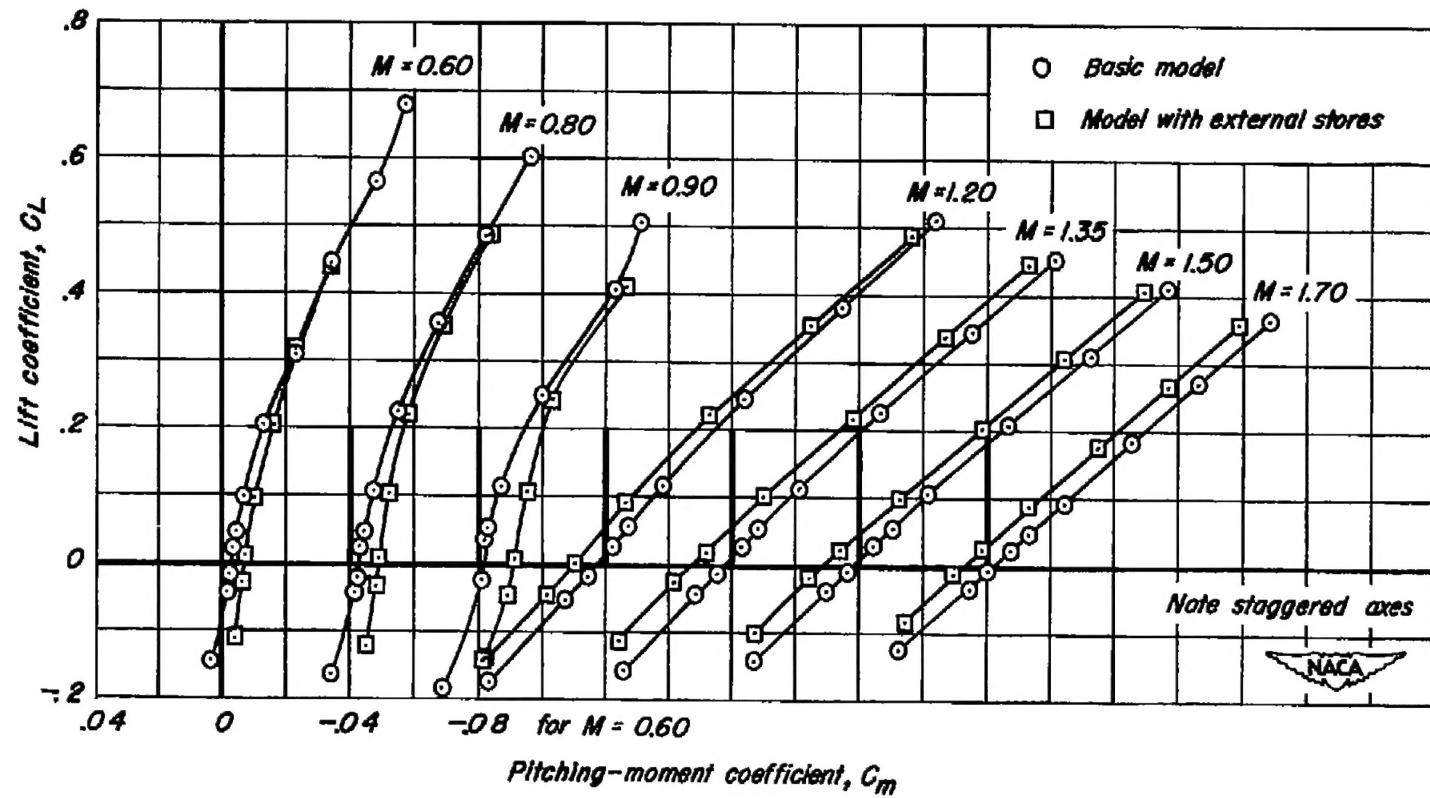


Figure 8.—Variation of pitching-moment coefficient with lift coefficient for the basic model and for the model fitted with two external fuel tanks and four faired rocket packets mounted on unswept pylons.

SECURITY INFORMATION

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